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Modern Ideas in a New England Shop

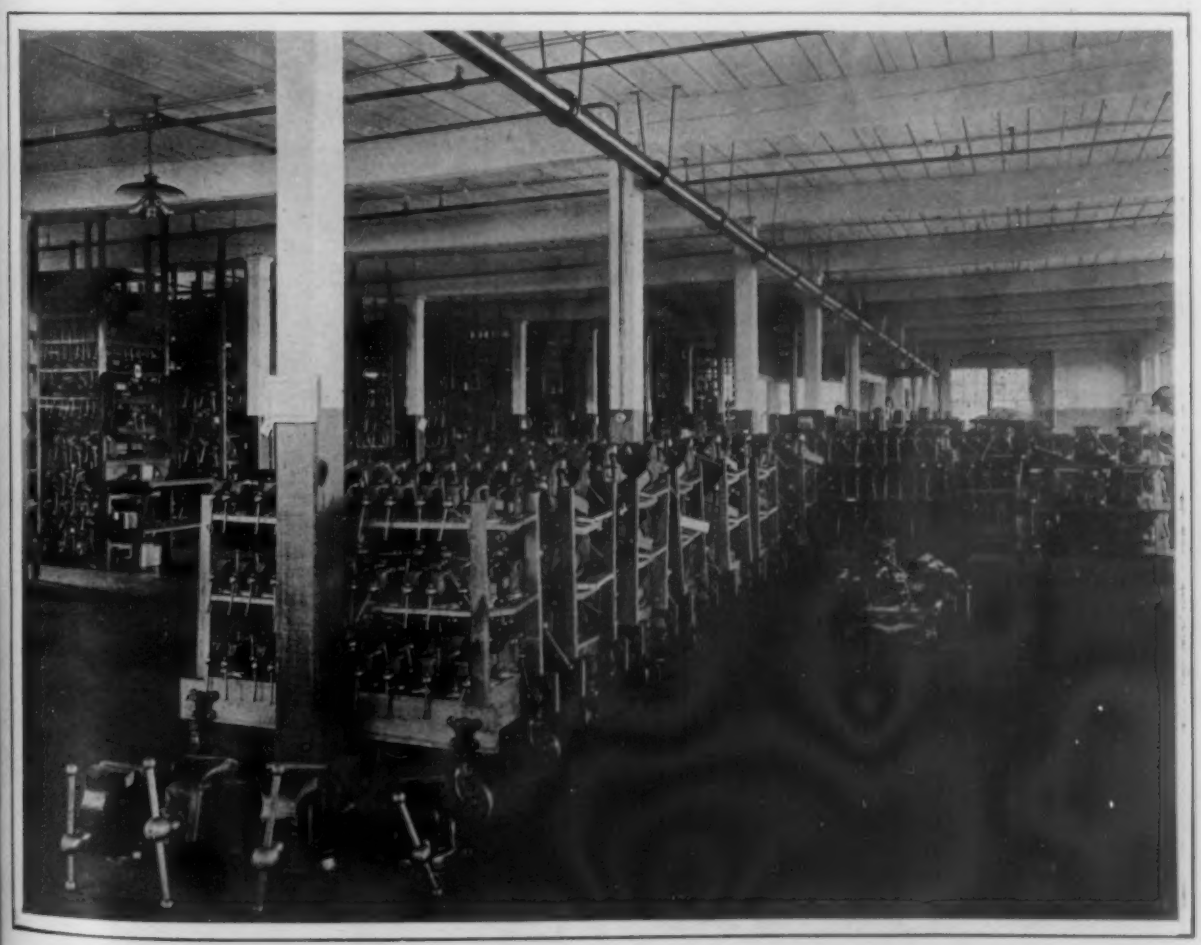
How the Athol Machine Company Proves That the So-called Big Plant Has No Monopoly of Efficiency, Safety or Welfare Work

BY W. E. FREELAND

"Yes, there are a lot of things that a big plant can do that we smaller manufacturers cannot afford the time and money for." This expression, so frequently uttered by men responsible for the production in shops of 25 to 200 employees, is particularly tantalizing to one who has opportunity to know how profitable are the methods and devices found in some plants of moderate or small size, to conserve the energy and promote the safety and welfare of employees.

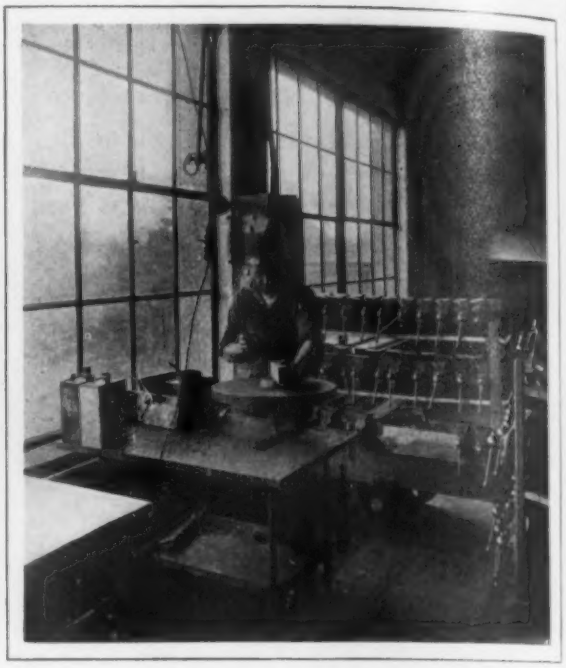
One good example of a thriving and progressive plant that has not outgrown the control and active management of one man is the Athol Machine Company, Athol, Mass. The general manager is Stephen E. French, an executive of the type that believes that the efficiency, welfare and safety methods of the largest manufacturing corporations can be utilized by the factory not particularly conspicuous for size, and, because of the close contact between manager and workmen, be made even more effective and profitable.

The plant is equipped for the manufacture of Starrett and Athol vises, and mechanics' fine tools, which are its chief products. It makes its own castings and executes some casting contracts for other concerns. The recent addition of a three-story machine and assembling shop of modern design has increased the output of the company to an



The Problem of Transporting These Heavy Loads, Often Weighing More than a Ton, in the Successive Steps of Manufacturing Has Been Solved by Greatly Strengthening and Adding Roller Bearings to Standard Fairbanks Trucks. One workman now moves loads formerly requiring three men

A New Britain Rod and Bar Rack Is Here Made More Serviceable by Shelves Which Support Short Pieces as Well as Long and Carry Two Sizes or Kinds of the Smaller Rods on One Set of Arms. The danger sign hangs at the height of a man's face, directly in front of dangerously projecting pieces



Good Light, Handy Trucks and Electrically Heated Asphaltum Paint Pots Greatly Facilitate the Finishing of Vises. The fire extinguisher just back of the workman's head shows the thoroughness with which the danger points throughout the plant are protected

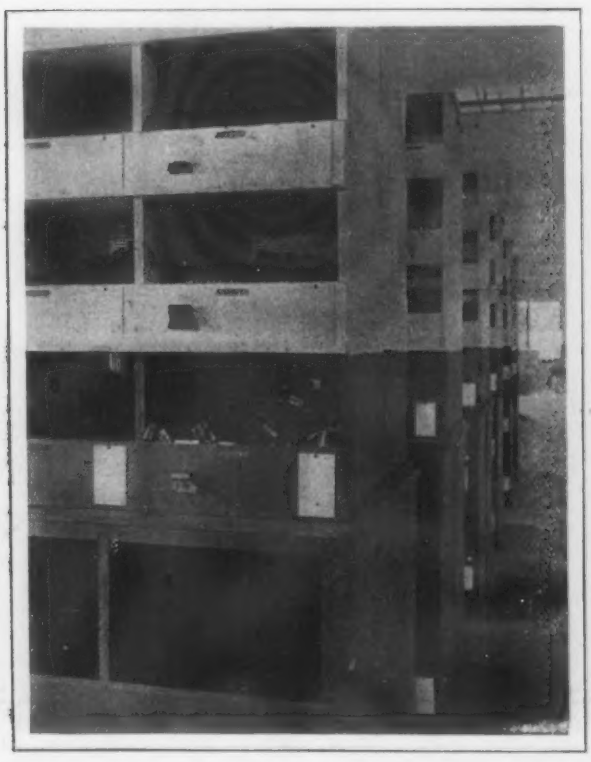
extent that taxes the capacity of the foundry. The foundry accident record shows almost a blank sheet and most of the employees have been with the company for many years. The danger points are marked with conspicuous signs or painted a brilliant red, and a ventilation system removes vitiated air, fumes and gases.

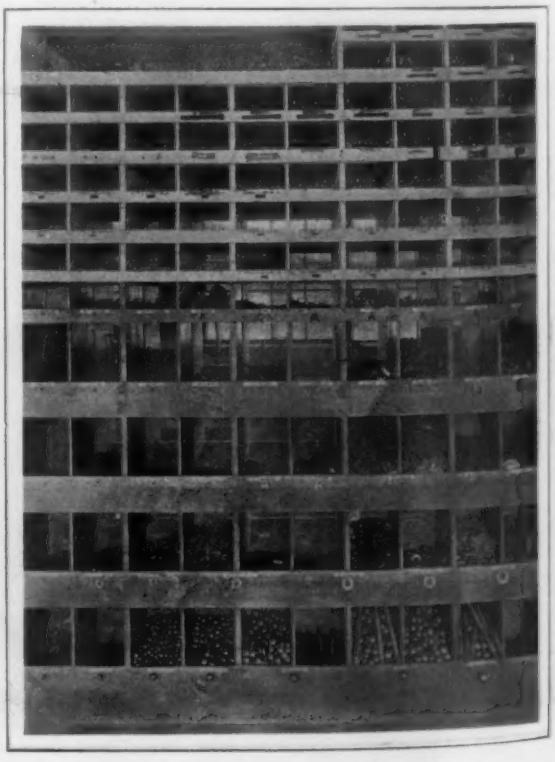
In the machine shop a considerable stock of small rods and bars is carried and of necessity these at times project considerably beyond the rack. When such is the case it is the invariable practise to suspend a large danger card directly in front of the ends of the rods so that it is necessary to push the card aside to hit the rods.

The dangerous open flame often used to warm asphaltum or other heavy paints is here eliminated by the use of an electric heater. The further precaution is taken to hang a Pyrene fire extinguisher beside each painter.

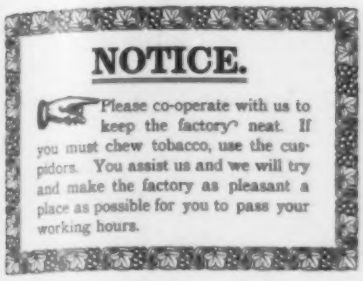
An elevator that is in constant use to transport heavy loads of vises from floor to floor has folding, steel-framed, heavy wire screens between the beams nearest the landing side. This prevents objects that may fall from trucks or landings from injuring the operator or the load that may be upon the elevator. Even though truckmen are careful, things do occasionally fall down an elevator well and a top guard over the elevator platform should be a part of the elevator equipment.

A locked door seems to be the only absolute

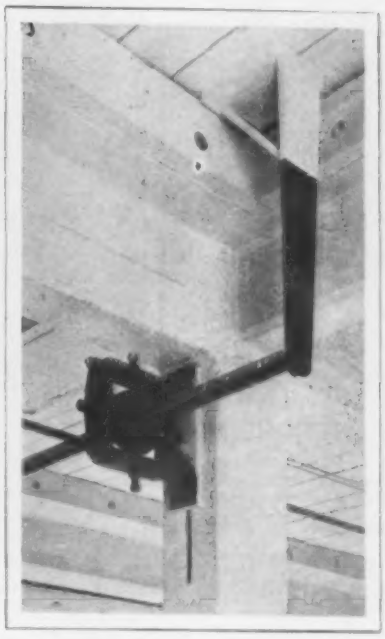




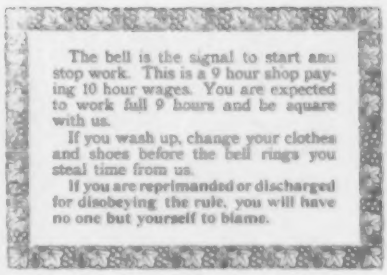
These Storage Bins for Small Parts Have a Specimen Part, a Plate Bearing the Name and the Number of the Part, and a Stock Record Card Attached to the Front of Each Bin. A noteworthy feature is the excellent lighting obtained by the use of heavy wire screen backwalls in place of the more usual boarding


NOTICE.
Please co-operate with us to keep the factory neat. If you must chew tobacco, use the cuspidors. You assist us and we will try and make the factory as pleasant a place as possible for you to pass your working hours.

Two of the Cards Hung at



The Ends of All Shafts Are Protected by a Board Projecting Downward from the Ceiling. The end of the shaft and the bottom of the board are painted red


The bell is the signal to start and stop work. This is a 9 hour shop paying 10 hour wages. You are expected to work full 9 hours and be square with us.
If you wash up, change your clothes and shoes before the bell rings you steal time from us.
If you are reprimanded or discharged for disobeying the rule, you will have no one but yourself to blame.

Different Points in the Shop

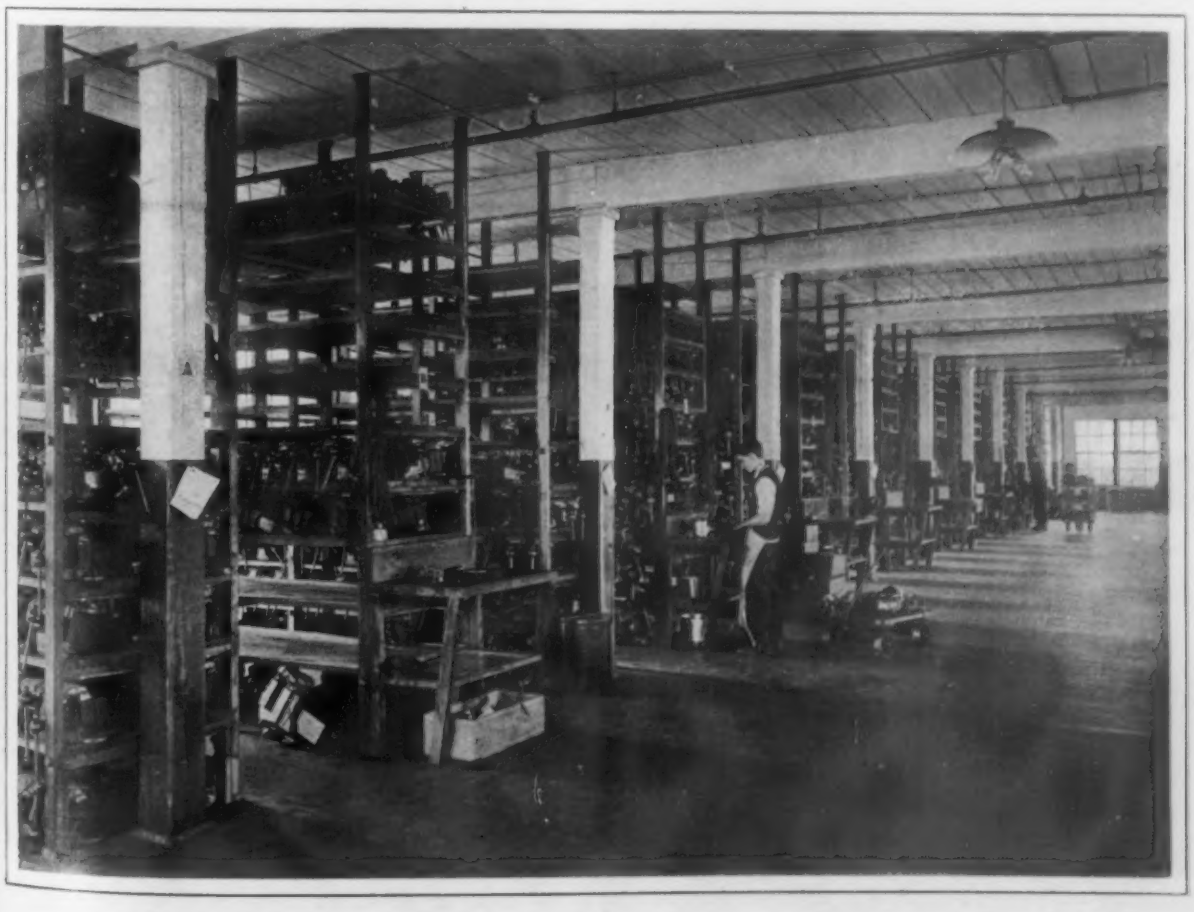
preventive that will stop the careless man from sticking his head into the well to see where the elevator is. In this plant there is no question as to the location of the elevator if it is in operation. A loud single stroke bell, operated by a friction wheel running against a corner guide, keeps continually clanging when the car is in motion.

The ends of shafting are protected by a board as shown in one of the illustrations. While this is not a danger point to which many operatives are exposed, it serves to show the thought that has been given to making the shop as safe as can be done by protective devices. Even the smallest and most unusual accident in this plant is followed up by an investigation and usually by the installation of some device that will prevent a repetition.

It is all too common to find a safety device which is unused because it takes too long to adjust it and thus production is slowed up. A simple expedient to overcome such a condition is shown by the illustration of a band saw guard. This is only one of the home-made devices of the shop.

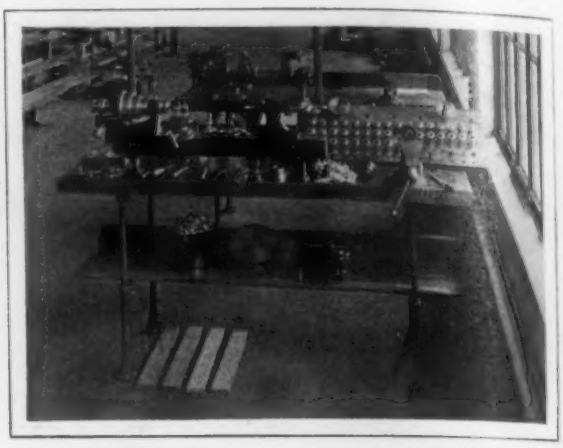
Here, as is so frequently the case, the center of the room has been found to be the place which could best be devoted to storage bins for parts. Usually one finds the lights in the aisles between the bins turned on much earlier than is necessary in the rest of the room. A stout wire-screen dividing-wall between two tiers of bins, placed back to back as is commonly done, permits the passage of light to an extent that minimizes this extra expense. Under daylight conditions there is no groping about in dark boxes to fill a parts requisition. A specimen part, a plate bearing the name and number of the part, and a stock record card are fastened to the front of each bin. The card is a duplicate of and serves as a check upon the stock clerk's card record. A balance column on the card and maximum and minimum limits are employed to check the condition of the stock.

Fairbanks trucks have done much to lessen the



The Stock of Completed Vises Is Kept in These Racks. A packing bench at alternate racks saves time and steps

To Lessen the Chances of Accident from Heavy Pieces Falling Down the Well, Heavy Wire Screens with Steel Frames Close the Opening Between the Front Beams. They are hinged so that they can be thrown out of the way when necessary



This Toolmaker's Bench, Which Was Being Fitted Up When the Photograph Was Made, Is the First of Several That Are Being Installed for the Manufacture of Fine Tools and Presents Several Interesting Points in Design and Layout

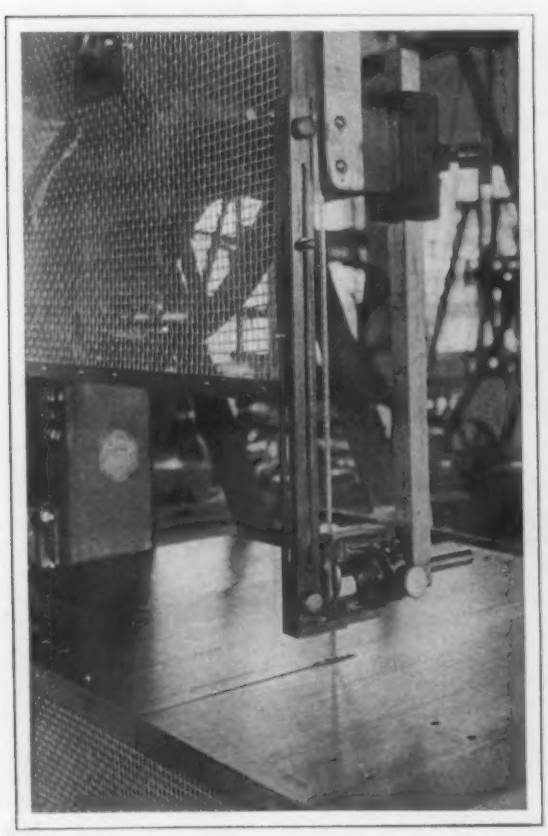
tax upon the workmen's strength and energy. There is no piling of vises and castings in boxes and lifting on and off work benches in the processes of machining and assembling. The pieces are taken one at a time from the truck and replaced when the particular operation is completed. This helps to decrease the number of handlings and has been found to be a big factor in speeding up production and preventing the damage that comes from piling castings and assembled vises upon one another on the bench or in a box. By adding strong reinforcing rods under the shelves of the trucks and equipping them with roller bearings, the load that can be easily moved by one man has been more than doubled.

It should be needless to state that particular attention has been given to sanitary fixtures, shop lighting, fire prevention and the other features that now characterize the well-managed and adequately-equipped plant.

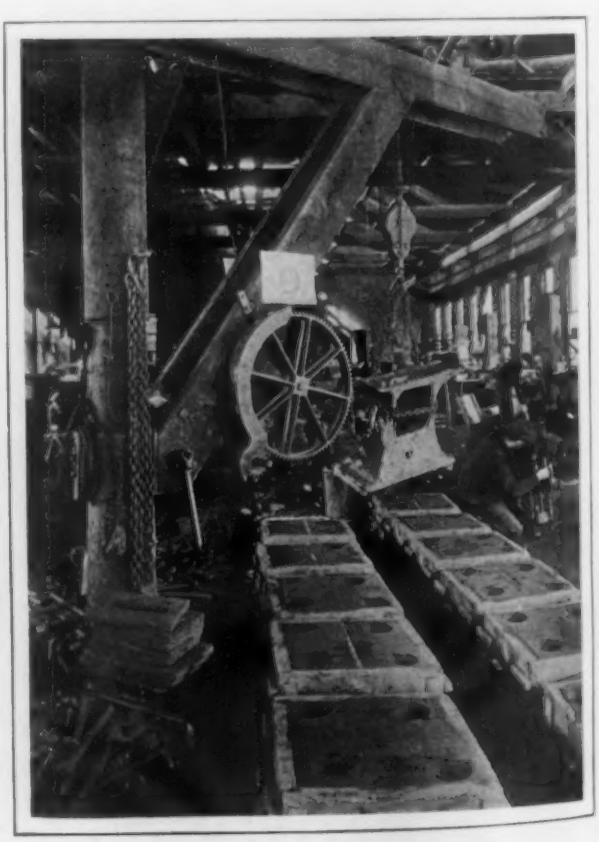
Mr. French has not been content merely to create and maintain a good shop spirit. He has built up a neighborhood spirit which is a distinct asset. A large vacant lot, really the front lawn of the plant, has been fitted up with playground apparatus for the benefit of the children and a beautiful wooded section of the bank of the river which runs beside the buildings has been turned over to the neighborhood as a picnic park. This is a popular place during the warm months.

A two-story building, formerly the office, has been equipped as an employees' club room and is much used noons and evenings. It is plentifully supplied with news and trade publications paid for by the company.

In his efforts to make the plant of the Athol Machine Company a pleasant, efficient and safe working place, Mr. French has been ably supported by L. S. Starrett of the L. S. Starrett Company, who has a large interest in the company.



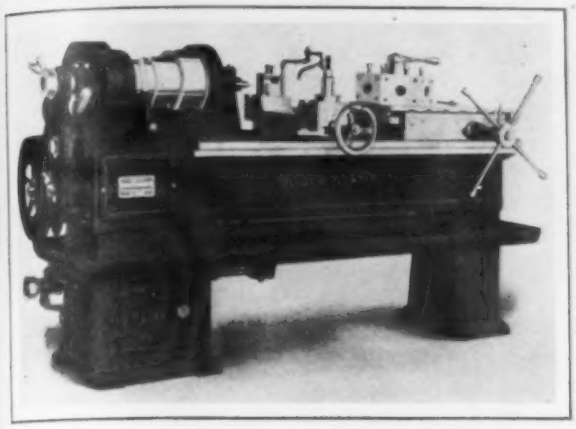
To Adjust the Bandsaw Guard a Washer and Spring Under the Head of the Screw Makes it Possible to Move the Guard Without Tools



The Guard Protecting the Gears on This Crane Is Painted Red and Bears the Legend "Never Leave Crank on Crane or Pull Crane by Gears"

Heavy-Duty 16-In. Turret Lathe

The Oliver Machinery Company, Grand Rapids, Mich., has placed a 16-in. heavy-duty turret lathe on the market. It is equipped with a three-step cone pulley double back geared drive, and the turret



A 16-In. Turret Lathe with Cone Pulley Drive Intended for Heavy-Duty Work

is operated either by hand or power, it being pointed out that unless heavy cuts are being taken it is unnecessary to use the clamping lever to hold the turret in position.

The bed is strong and deep with box-section reinforcing, the supporting columns being placed to avoid overhang at the ends of the bed and made wide enough to shorten the span of the bed between the columns. The standard size of bed is 86 in. long, 15 in. wide and 13 in. deep. The headstock is of the three-step cone pulley double back geared type, the power being supplied by a 3¾-in. belt. A door to give access to the interior shelving, which can be supported on the corner brackets, is furnished for the headstock. The spindle is of high carbon steel finished by grinding and is lubricated by felt wipers feeding from large pockets. The cone pulley is designed to carry a large oil reservoir containing a supply of lubricant sufficient for long periods. The driving pinions for the back gears are a single solid high carbon steel forging and are pressed into the cone pulley and keyed in place. The spindle has 18 speeds, ranging from 14 to 335 r.p.m., and a special bronze bushing is provided to give a bearing for the spindle in the driving gears and the thrust is taken against the front end of the rear bearing housing by a hardened and ground steel collar.

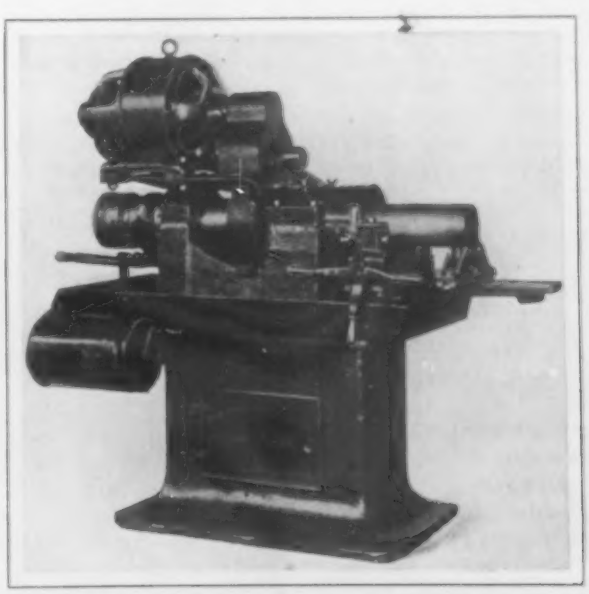
The turret is of the standard hexagonal type and measures 12 in. across the flat. The holes for the tools are 2 in. in diameter and four holes are tapped on each face to secure tool holders or other special equipment. The turret slides in a heavy base secured to the bed and revolves on a large stud, it being pointed out that the fit of the latter is such that it is not necessary to use the clamping lever at each operation unless heavy cuts are being taken. The turning of the handwheel to force the turret slide back automatically releases the locking plunger and revolves the turret to the next station. This locking plunger is of tool steel with taper gibs to keep it in alignment and seats itself in a hardened steel ring underneath the turret. Gearing connects the turret with the spindle and enables the former to be operated by power feed if desired, four rates ranging from 0.01 to 0.02 in. per revolution of the spindle being available. When it is desired to employ hand feed the power feed lever is tripped, which drops the feed shaft worm out of mesh with the wormwheel. If desired the whole turret mechanism can be moved up close to the headstock when short work is being machined. The feeds are driven positively by a heavy chain running from the spindle to the feed box. This box, which is of a somewhat novel design, is located on the bed of the lathe at the rear and is controlled from the operator's position in front. To provide protection against breakage due to overload a shearing pin is provided on the main feed shaft.

The cross slide is 6 in. wide and has taper gib adjustment. The tool-post has capacity for large tools and the forming tool holder is equipped with hardened steel corrugated raising blocks. Both of these are interchangeable and the T slots are the same size. A large handwheel and coarse cross feed screw are relied upon to provide a rapid and powerful feed.

Heavy Bar and Tube Cutting-Off Machine

A heavy-duty machine designed for cutting off solid and tubular stock up to 5 in. in diameter has recently been brought out by the Etna Machine Company, Toledo, Ohio. The stock is held by a push-in spring collet, which is bushed down to hold the different sizes. The collet, which is 8 in. long, is operated by a hand-lever pawl and clutch tube, and it is stated that its chuck is stocked rapidly and accurately. A double cutting-off tool is used to increase the output and insure a square cut.

The machine is driven by a Westinghouse adjustable-speed motor that is geared directly to the spindle. The motor has a speed range from 575 to 2300 r.p.m. and a gear ratio to the spindle of 11 to 1. The controller is placed on the front of the machine, where it is within easy reach of the operator. The standard equipment includes three stock supports, stock gages, two bushings and the master collet. The stock supports contain rolls to insure steadiness of the stock. A centering attachment may be added which will center the ends within 0.005 in. It is stated that it is not necessary to allow for a finishing cut on the ends of the stock, as the tools leave a square, smooth finish.



A Heavy-Duty Machine for Cutting Off Solid and Tubular Stock Up to 5 In. in Diameter Equipped with Motor Drive and a Push-In Spring Collet

The nickel industry has probably been affected less by the war than that of any other non-ferrous metal. Total exports for the first nine months of this year were 21,259,631 lb., which compares with 21,862,707 lb. and 21,474,688 lb. for the same periods in 1913 and 1914 respectively. The average exports for the third quarter, however, were 1,615,795 lb. per month, as compared with 2,355,635 lb. per month in 1914.

Lack of Uniformity in Steel Castings

Some of the Causes and Remedies—Close Co-operation Between Pattern and Molding Departments—Character of the Steel

BY J. H. D. EAGAN

Not infrequently a great diversity is found in the quality and form of steel castings of the same design, as made by different foundries, indeed, in castings from the same pattern as made by one foundry. This is more a result of variation in foundry practices, and of improper foundry practices, than of variation in quality of metal. But because the steel foundryman has much to contend with that an iron foundryman has not, on account of the quicker solidifying properties and greater shrinkage of steel than of iron, a word on the character of steel for steel castings and the adaptability of different steel processes to different classes of steel castings seems pertinent to this subject, as does also some discussion as to provisions for the shrinkage of steel.

DESIGNING MACHINE PARTS

In designing a machine or piece of equipment, it is of great importance that, second only to the efficiency of the machine or piece of equipment for the purpose for which it is intended, consideration should be given to having the design of the castings simple, particularly as regards adjacent heavy and light sections. Usually too little attention is given to this. Saving in weight and machine work in designing is very often poor economy for the machine or equipment builder, as there is great risk to the reputation of the machine or piece of equipment from internal defects and strains in the casting, which may develop in breakage early in the service, if indeed this saving is not previously offset by loss of machine work on castings which afterward prove defective as well as by delays incident thereto.

PATTERN CONSTRUCTION

The idea so prevalent that, since only a few castings are required, any kind of pattern made to be molded any way is all that is required, is a great reflection on the foundry trade. It is poor economy to save pattern costs when the result is so very liable to be a greater loss in defective castings, in machine work on castings which afterward prove defective, delays incident thereto and in subsequent failures of castings in service. Patterns in all cases should be prepared according to the dictates of the foundryman; or, better yet, by combining the ideas of the foundryman and the patternmaker (those of the foundryman predominating), whose relations cannot be too close.

The pattern department should be regarded as of almost equal importance to the foundry department. If patterns are to be made at a point distant from the foundry, blue prints should be sent to the foundry to be marked and to obtain also a description of how the foundry desires the patterns prepared. If the design calls for too light sections adjacent to heavy sections, as in the case of light spokes and heavy hub and rim of a wheel, for safe castings, the foundryman should insist that the light section be made heavier, or the heavy lighter to an extent to insure safe castings, and the purchaser could be made to see the advantage. Before the patterns leave the pattern department of the foundry, the location, size and shape of the gates and shrinkage risers and their opening into the casting should be marked with paint on the pattern under the direction of the foundryman, combined with the suggestions of the patternmaker.

Sometimes the shape of the casting is such that openings for the gates and risers, insufficient for proper pouring and shrinkage of parts, is impossible without adding extensions to the pattern at the required points. In such cases these should be added and the removal from the casting of this extension, if necessary, should be done by the purchaser, as it is for his interest that such procedure is warranted in order to obtain uniformly good castings. Such additional costs to the purchaser, as are indicated herein to insure uniformly good castings, will average much less than losses entailed otherwise by machine work in castings which afterward prove defective, delays incident thereto and breakage in service. The trouble and expense to the casting manufacturer in obtaining the approval of the purchaser for pursuing these practices is more than offset by the additional weight which is obtained in the castings and the saving of loss by reason of defects which otherwise result.

FOUNDRY PRACTICE

Proper pattern and auxiliary rigging in line with the foregoing removes as much as possible the element of human error which at best enters into the foundry business to a greater extent, probably, than into any other, because comparatively little of the process of making castings can be done by machinery, which enables mechanical precision and uniformity. Therefore the closest possible attention and best judgment is required in selecting quality of sand, in its mixture and temper, in the making of molds and cores, in their venting, in the drying of them, in the preparation for pouring and in the pouring itself.

Venting.—The venting of molds and cores and the matching of core vents with mold vents is very important for uniformly good castings, but ordinarily too little attention is given to it, particularly to venting the molds. This fault exists more in steel foundries than in iron foundries. All molds had better be over-vented than under-vented, and vented well through the cope, as well as at the partings of the molds, particularly the cope, at high places in the mold. All vents had better be larger than actually necessary.

Drying Molds.—Where molds have to be dried before pouring, the firing of the ovens should be slow during the first six to ten hours according to the amount of sand contained therein. This enables bringing up the temperature of the entire mass of sand in the oven to the temperature at which all the moisture contained in the molds is converted into vapor at the same time. Then the oven can be fired as fast as possible and the moisture throughout the mass will be eliminated uniformly. If on the other hand the oven is fired very hot from the start, the mold will be "skin dried," thus sealing the moisture in the interior and rendering it much more difficult to eliminate it.

By pursuing the practice described in drying molds, it will be observed that the sand will adhere to the surface of the casting much less than otherwise. This procedure in drying molds tends to temper the sand as well as to dry the molds.

SHRINKAGE OF STEEL

The shrinkage of steel is about double that of iron which necessitates extraordinary judgment in the designing and preparation of patterns, in rigging and in providing against shrinkage cavities in heavy sections and shrinkage cracks and strains in different parts of castings, particularly at the junctions of heavy and light sections. In many cases shrinkage may be best provided for by chilling the metal in heavy sections by placing nails or pieces of bar steel in the mold at such points, so the molten metal will surround and cement with them when it is poured into the mold, thus causing the heavy sections of a casting to become solid nearly simultaneously with the light sections. Judgment should be exercised so as not to have more of these chills nor too large ones in the mold at any point than will cement well with the molten metal. Chills on the surface of the mold for steel castings do very little good.

CHARACTER OF STEEL FOR CASTINGS

On account of the quickness with which steel solidifies, it is necessary for steel for castings to have a higher temperature than for pouring into ingots. In all processes except the crucible and electric the higher the temperature the longer the raw material used in making the steel must be exposed to the oxidizing action of the flame and air. This means more oxidizing of the metallic iron, which takes place to a more or less extent in all processes except the crucible and electric, and results in correspondingly greater brittleness of the steel. In the processes other than the crucible and electric, if care is not exercised by the furnace operator, or the design of the furnace is not right, the oxidization of the metallic iron may be carried to the extent that, regardless of temperature, the metal will act the same as cold metal—it will not run. By certain heat treatment, steel that has been so highly oxidized as to be brittle, may be redeemed.

It, therefore, follows that the best process for the manufacture of steel castings is that which will enable the highest temperature with the least flame action. Crucible and electric steel are considered by most purchasers too little superior to that made by other processes as compared to their cost, to be commercial for any purpose other than very special ones.

It costs less to make steel by the open-hearth process than any other, but it is impossible to make steel by this process hot enough to pour the thinnest sections, in proportion to the area, as in small castings, without over-oxidizing the metallic iron, because there is flame and air action on the metal by this process for a much longer time than is necessary in the convertor process, and the wear and tear on this type of furnace operating to such temperatures would be prohibitive. It is for this reason that even though it costs more to operate, the convertor process has been developed to produce small castings for general commercial use most successfully, while the open-hearth generally suffices for castings larger than about 250 lb.

CONCLUSIONS

Since there are so many important details requiring so much concentrated attention and as neglect or carelessness in almost any one of them means an inferior or defective casting, and as the work of molders varies so much, every foundryman should have plenty of assistants, distributed so that none of them has too many molders or details to direct and watch, in order to obtain the highest possible grade of castings with the greatest uniformity. There is a tendency to slight this point in favor of economy.

The finishing of uniformly good castings is a simple matter and needs no discussion. Likewise the inspection, since all that can be discovered by the foundry is surface defects which can readily be detected by the foreman of the finishing department, or if such should get by him, the shipper, who should be held responsible for final inspection as regards surface defects and finishing.

With foundries properly organized to carry out these general practices, there should not by any means, be the lack of uniformity of product and generally deprecative opinions, which are accredited to the foundry trade.

Chicago Tariff Conference's Action

The nation-wide tariff conference of manufacturers held at the Congress Hotel, Chicago, Dec. 7, under the auspices of the Illinois Manufacturers' Association, adopted the following resolutions:

For Immediate Tariff Revision

Whereas, The present European conflict and its ultimate cessation create economic conditions that compel immediate tariff readjustments, to protect the rights and interests of the United States among the industrial nations of the world;

Whereas, The operation of the present tariff law has again demonstrated that the principle upon which it is based is detrimental to our national prosperity; be it

Resolved, That it is the sense of this conference that we favor such immediate revision of tariff schedules as will provide ample revenue for the necessary requirements of government expenditures, and, in addition, protect the employment of labor and capital in the industries of our country from the dumping of foreign products on American markets, and from unfavorable trade conditions that result from difference in cost of production at home and abroad;

Resolved, That, as an aid to the ultimate solution of the problems of tariff schedules, we favor the creation of a permanent tariff commission, or other necessary official agency, to investigate the operations of the then existing tariff law, with the purpose of furnishing expert information to Congress from time to time, enabling it to make such changes as may be necessary to correct inequalities, while maintaining sufficient rates to insure the continuance and further development of American industries and maintenance of American standards of living and provide required government revenue.

To Help American Dye Makers

Whereas, The manufacture of dyes has been almost exclusively monopolized by European countries, but American chemical manufacturers are now making a stupendous effort to develop processes and manufacture the dye products at present largely precluded by the war, therefore; be it

Resolved, That special consideration to be given to the advisability of requesting Congress for a substantial tariff upon dye products to the end that research of American chemists be encouraged and this great industry be fostered in this country.

Following are the names of the members of the committee on organization: Charles Piez, Link-Belt Company, Chicago; Max W. Babb, Allis-Chalmers Mfg. Company, Milwaukee; James E. Bennet, Printing Press Manufacturers' Association, New York; Joseph R. Grundy, William H. Grundy & Co., Bristol, Pa.; B. A. Van Winkle, Hartford City Paper Company, Hartford City, Ind.; U. G. Orendorff, Parlin & Orendorff Company, Canton, Ill. This committee will promptly submit a plan having in view united action on the part of all associations whose members are interested in changes in the tariff.

The report that the Toledo Furnace Company, Toledo, Ohio, will build a steel plant and additional blast furnaces is officially denied by Pickands, Mather & Co., the controlling interest.

Commercial Production of Sound Ingots

Freedom from Segregation and Pipes by the Use of a Mold of Special Design—Its Application in Making Shrapnel in Canada

BY W. D. BRADFORD

There probably has not been a time in the history of the manufacture of steel when the demands of the consumer have been so exacting as at present. The necessity of producing a steel, which is practically uniform in chemical composition and free from blowholes and pipes, has been brought about by the fact that so much of the steel is heat-treated, revealing later some of the causes of failures in service. The automobile industry, which is the third largest in the United States, heat-treats practically all of its forgings and it cannot afford to spend time preparing the different parts and then reject them for defects which manifest themselves in the final steps of the procedure.

Lack of uniformity or segregated material is not always detected by chemical analysis because it is not always practical to make a sufficient number of analyses, but for very well-known reasons ruptures occur just after quenching or when the parts are subjected to severe strains in service. If the cavity or defect caused by piping is large, the steel will crack while being quenched, and if a small or bridged pipe exists, it may fracture at any time.

Steel which requires no heat treatment and is used in the condition in which it comes from the rolls may be in service for some time before the effect of these conditions is detected, but they will eventually develop. Some of our railroads have proved that a large percentage of the failures in rails have been due to either one or both of these causes. It is obvious that the better grades of steel, especially those on which considerable machining is to be done, should be as free from blowholes as possible, so that it is necessary to use a deoxidizer in the furnace or ladle to remove as much of the gas as possible, and make the steel lie quietly in the molds. In an ingot of this kind, the top and sides begin to freeze very quickly, and as the liquid ingot will occupy more space than the solidified one, we have an ingot with a minimum number of blow-holes but with a maximum cavity or pipe.

This mass of metal will begin to solidify at the exterior walls which are in contact with the sides of the mold, and as the tendency of the hottest metal is to rise, the last portion to freeze will be in the center and toward the top. The elements which have a lower melting point than the mass of iron will also follow this direction and we may expect to find the segregation along the central axis and the greatest near the top. The pipe in an ingot of this kind may be one-half or even two-thirds of its entire length and one can never be sure just when it has all been cut out of the rolled bloom or billet.

In order to overcome this condition it is necessary to have a progressive cooling from the bottom upward, at the same time the top should be kept in a molten condition so that the metal may fill up the cavity formed by the ingot as it freezes, and by keeping the top open, any contained gases will have a tendency to rise to the extreme top, and as this portion of the ingot is the last to solidify, the maximum segregation will be very close to the bottom of the cavity and will be discarded with it.

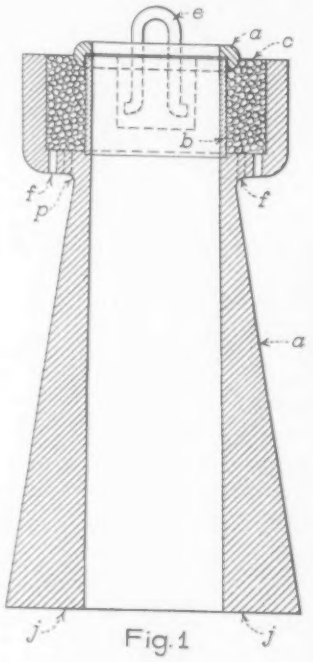


Fig. 1

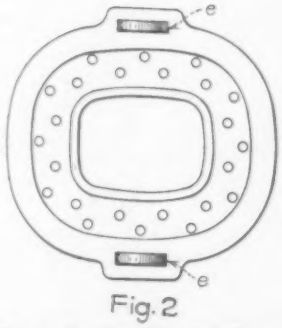


Fig. 2

Fig. 1 Is the General Appearance of the Bradford Ingot Mold. Fig. 2 is a cross-section of the upper portion

The principle of using a sink head or hot top has been in use in the manufacture of steel castings for a great many years, but a commercial application of it has only recently come into use in connection with ingots which must be charged into soaking pits and rolled a few hours after being cast.

A mold, designed by the writer, is shown in Fig. 1, which has been in use for the past two years. Steel cast by this method and rolled into blooms is free from pipes and excessive segregation after a nominal discard has been made. The mold shown in Fig. 1 has the usual taper, but about 16 in. from the top the walls widen, and the shape of the ingot is prolonged by the use of four tiles which dovetail at the edges and are reinforced by the casting *d* which rests on top of them. Between the tile and the walls there is a chamber *c* about 6 in. in diameter all around the top of the ingot, and in this chamber is placed charcoal or some other material which supplies sufficient heat to keep the top molten during the freezing of the balance of the ingot. The holes, *f*, are to allow a draft for the material while being burned. Fig. 2 shows a cross-section of the top.

It will be noticed that the walls of the mold are very much thicker at the bottom and gradually taper down as they near the top, so that although the largest amount of steel is at the bottom, the heavier walls of the mold absorb the heat much more quickly and solidification takes place from the bottom upward. As there is always a reservoir of molten metal at the top and the tendency of excessive segregation, owing to selective freezing, is usually at the part which solidifies last, the shrinkage cavity and segregation will be at the extreme top of the ingot.

This condition may be very readily verified by allowing an ingot to stand several hours before stripping, for several feet from the bottom the ingot will be black with a gradual appearance of color as we near the upper portion, while the hot top will be about 1800 deg. Fig. 3 shows a com-

Fig. 3 Gives a Comparison of Two 18 x 14 x 60-In. Ingots from the Same Cast, the One at the Left Poured in a Regular Mold and the One at the Right in a Bradford Mold

parison of two ingots 18 x 14 x 60 in. from the same heat cast side by side, the one in a regular mold and the other in a Bradford. This ingot was split and drilled as indicated about 2 in. below the bottom of the cavity, at the center and at the bottom and the carbon was as follows:

Top Center	Center	Bottom Center
1.26	1.26	1.23

The ladle test of this heat analyzed 1.23 per cent carbon. Figs. 4 and 5 show the usual form of the pipe cavity produced by this method. Fig. 4 is a 23 x 23-in. ingot weighing 10,500 lb. and Fig. 5 is a 20 x 20-in. ingot weighing 6750 lb. This ingot was drilled as shown in the illustration and the analyses were as shown in Table 1:

Table 1—Analyses of Drillings from the Ingot in Fig. 3

	No.	Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent
Top center	1	0.80	0.46	0.036	0.051
Center	2	0.47	0.42	0.019	0.022
Center	3	0.49	0.44	0.020	0.023
Center	4	0.48	0.44	0.021	0.021
Center	5	0.48	0.44	0.018	0.022
Top side	1	0.48	0.45	0.020	0.022
Top side	2	0.52	0.46	0.021	0.023
Top side	3	0.50	0.45	0.021	0.023
Top side	4	0.50	0.44	0.021	0.023
Top side	5	0.48	0.44	0.021	0.023
Ladle		0.48	0.44	0.023	0.024

No. 1 was drilled 2 in. below the pipe cavity.

In order to determine the location of the maximum segregation and how much of the ingot it was necessary to discard so that it would be completely removed from the finished product, an ingot was split and drilled. The results showed that all excessive segregation is within 4 to 6 in. from the bottom of the pipe cavity. It is our practice, however, to analyze the top, middle and bottom of an ingot from each heat as rolled and we know from past experience that the results found by this method invariably give the range of chemical content in the heat, and this variation from top to bottom is always within reasonable limits. A number of these tops have been cut off through the solid metal and their average weight is 6 per cent of the ingot, leaving 94 per cent of sound steel.

The sketch, Fig. 6, shows the results obtained by a steel plant in Canada using a Bradford mold for making shrapnel steel. The pipe cavity is the usual form shown with photographs, and the uniformity in chemical composition simply corroborates our own results.

For several months after this mold was introduced, one-half of each heat was cast in the regular molds and the other half in the patent ones and an accurate record of the percentage of finished product was recorded. The blooms or billets were sheared hot and short pieces were cut off until the pipe was completely removed. The percentage of finished product was as given in Table 2.

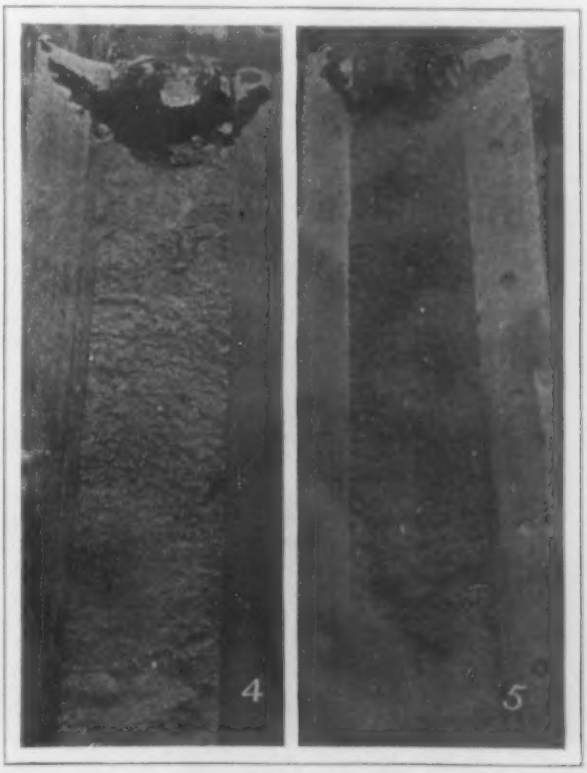
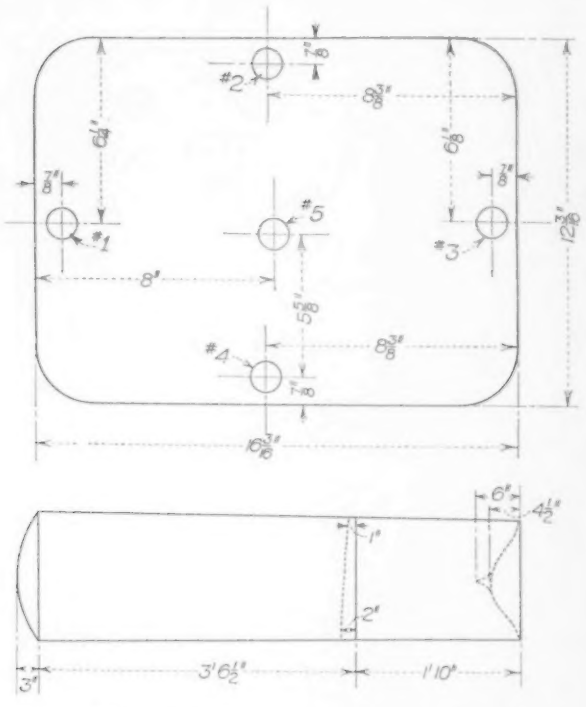


Fig. 4 Is Part of a 23 x 23-In. Ingot and Fig. 5 Part of a 20 x 20-In. Ingot Poured in Bradford Molds



Physical Properties	
Elastic Limit lb. per sq. in.	57080
Ultimate Strength lb. per sq. in.	91840
Elongation on 3/64	
Elongation in Per Cent	24.2
Reduced Area in Per Cent	33.

Chemical Analysis				
Hole	C	P	S	Mn
1	.491	.02	.038	.62
2	.493	.02	.036	.63
3	.488	.01	.037	.61
4	.488	.02	.039	.63
5	.496	.02	.038	.62

Fig. 6 Represents the Results Obtained by a Canadian Steel Plant Using the Bradford Mold in Making Shrapnel, the Upper Being a Cross Section of an Ingot Showing Drill Holes

Table 2—Percentage of Finished Product from Bradford and Regular Molds

	Bradford Per Cent	Regular Per Cent
0.75 per cent carbon steel	78.5	51.1
1.20 per cent carbon steel	78.3	58.9
0.85 per cent carbon steel	82.2	70.0
1.23 per cent carbon steel	82.5	62.1
0.25 per cent carbon chrome steel	82.1	62.2
0.25 per cent carbon chrome-nickel steel	86.9	75.5
3.50 per cent nickel steel	82.1	66.0
3.50 per cent nickel steel	80.5	61.5
0.25 per cent carbon high manganese steel	77.5	58.0
5.00 per cent nickel steel	82.3	55.2
0.68 per cent carbon steel	82.0	54.8
Average	81.3	61.4

We have found that it is not at all necessary to cast ingots by this method with the large end up, as the results were so similar that it did not warrant the extra labor which this method entails. Fig. 7 is a photograph of a split ingot cast in this way.

I may mention in conclusion that we have tried out several other methods for eliminating pipes and segregation, but none of them has given the results which we have obtained by the Bradford mold.

Preparedness in Labor Management

Discussing the management of labor in a recent address on "Preparedness in Business" before the Efficiency Society at a meeting in New York City, John Calder, president Manufacturers' Equipment Company, Boston, has among other things the following to say:

Do not attend to all else and give the human problem "absent treatment." More and more society in this favored land is becoming just "all-of-us," and the capitalist or executive who does not want to belong is quite unfitted for the new industrial age. When times are tranquil and relations are harmonious, get acquainted with your people and let them become acquainted with you. Let trust and confidence be shown and you will not reap distrust and suspicion. Do not let the sowers of good-will be accompanied by a brass band or attempt to hasten the capitulation of the doubter by paternalistic policies which he cannot appreciate.

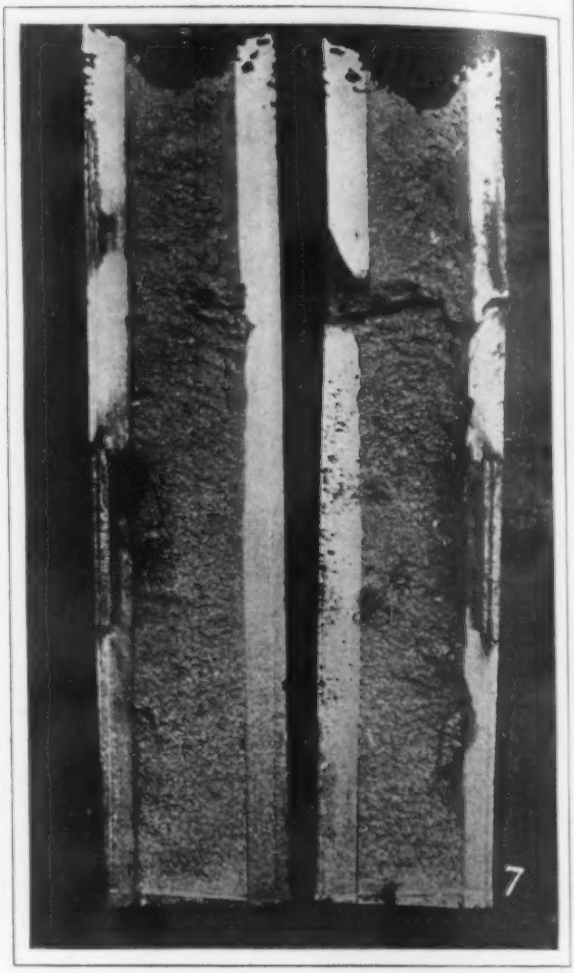


Fig. 7 is a Split Ingot Cast Large End Up in a Bradford Mold

Some one in all our large plants and organizations should be charged with this sort of preparedness; the sensing of the inarticulate but none the less real misconceptions—often grotesque—grievances and trivial grudges which, massed in time in narrow minds, are formidable obstacles to progress. Every business must meet the impact of troubles of outside as well as inside origin but, if you know your people and they know you, you will not have to wake up in surprise and chagrin at the number of things you felt comfortably sure of, which turn out to be not so.

Here then is the conclusion of the whole matter of business preparedness. It is simply the concentration on the inceptions in every department of the best minds we have and the provision for systematically widening and recording experience. Behind every method, every practice, every custom in business and society alike lies an idea or group of ideas—a theory—a reason. Hence, the only practical things in life are ideas; the only practical man, the man of ideas, the man who knows, not merely the man who does. Behind our individual practice, whether we are conscious of it or not, lies the theory, and only he who knows it possesses the rule of the higher practice and can take the next step wisely.

The J. I. Case Threshing Machine Company, Racine, Wis., has made arrangements to institute a system of apprenticeship in all its factories, on condition that the Industrial Commission of Wisconsin will permit apprentices to lump attendance at continuation school in one full week each month instead of five hours each week, as provided by the Wisconsin apprenticeship law.

The Milwaukee Grinder Wheel Company, Milwaukee, Wis., has filed a voluntary petition in bankruptcy. Assets are scheduled at $55,397 and liabilities at $43,113. Unsecured claims total $24,411.

Machine for Routing Shell Fuse Heads

A single-purpose machine designed especially for routing the wrench slot in graze fuse bodies has been developed by the George Gorton Machine Company, Racine, Wis. It is entirely self-contained and has an hourly production capacity of 120 pieces of steel, this figure of course being increased if brass is the material used.

The hardened tool steel spindle runs in ball bearings and is mounted in a sleeve which has a horizontal movement of 2 in., controlled by the lever *A*. A micrometer stop, reading to 0.001 in., is furnished and is relied upon to insure a uniform depth of slot. When the cutters are being changed a gage is swung into position in front of the spindle to determine the exact position of the cutter. The cutter is then clamped in the spindle collet and the gage drops down and out of the way.

The countershaft, which is mounted on the machine, revolves in ball bearings which are grease packed as is the case with all the ball bearings of the machine. The power for driving the machine from the countershaft is received by means of a belt connection either from the lineshaft or a motor mounted on a bracket bolted to the underside of the machine shelf. The speed recommended for the countershaft is approximately 2000 r.p.m., but this is varied somewhat according to the nature of the work.

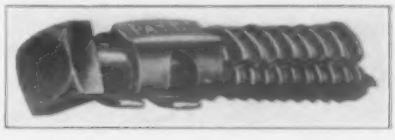
The fuse body is mounted on a plug in the reciprocating work holder and is clamped securely in place by a half turn of the knurled screw *B* in the swinging clamp. The work is located in the proper position by the horizontal plunger *C*, which enters the percussion pellet hole. The motion of the work holder is derived from a reciprocating mechanism, through an eccentric shaft and link.

The equipment of the machine includes a cutter lubricating system, consisting of pump, tank, strainer, relief valve, the necessary piping and a flexible tube for delivering lubricant to the cutters. The pump is driven from the countershaft by a belt. After the lubricant has been used it flows from the work holder into the lower part of the cutter head and through a drain pipe into the tank. This tank is divided by a wall extending almost to the top which is relied upon to prevent the chips in the lubricant from flowing into the suction chamber.

A Recently Developed Machine for Routing the Wrench Slot in Fuse Bodies of High-Explosive Shells

New Expansion Shield for Lag Screws

Newness of operating principle and design are two features claimed for the type of expansion shield for lag screws placed on the market by the Diamond Expansion Bolt Company, 90 West Street, New York City. It is intended for heavy duty by contractors, builders and iron workers and in similar lines of construction work where screws have to be placed in material that does not afford a good grip for the threads.



A Single-Unit Expansion Shield for Lag Screws Which Permits the Screw to Make Direct Contact with One Side of the Hole

As will be noticed from the accompanying illustration the design is simple, the shield being a single unit. The screw enters at the center at the outer end and travels along the tapered bore which causes it to emerge at the side and make direct contact with the side of the hole as well as with the shield. In this way, it is emphasized, a greater displacement is secured at the inner end which is relied upon to give a large amount of expansion where it is needed.

Light-Weight Portable Electric Drill

An electric drill of notably light weight and simple construction has been placed on the market by the Standard Electric Tool Company, Cincinnati, Ohio. It is known as the Midget drill, and made in three sizes for tools ranging from 3/16 in. to 5/16 in. in diameter, the weight of the largest size machine being only 8 lb. The drill is constructed on the unit plan and consists of only five simple parts, while the wire, electrical connections and brush holders are contained in the frame and the armature runs in ball bearings which are incased in dust-proof chambers. The motor has forced ventilation by a high power fan, and a quick make-and-break switch of the plunger type which is located in the side handle is designed to give the operator control at all times. Case hardened steel is used for the gears which are incased in grease and the chuck spindle has thrust bearings. Emphasis is laid upon the fact that both end caps can be taken off and the tool dismembered easily and without disturbing any electrical connections.

Tungsten ores high in phosphorus can be treated so as to remove most of the phosphorus with little loss of tungsten, according to a patent (U. S. 1,153,594) granted to Frederick M. Becket of Niagara Falls, N. Y. The inventor has discovered that if the ore is treated at a red heat with concentrated sulphuric acid, the phosphorus is soluble while the tungsten is rendered nearly insoluble. The tungsten-phosphorus ratio is thus changed from 204 to 3093 with a loss of less than 1 per cent of the total tungsten.

BETTER GRAY-IRON CASTINGS*

More Instructive Supervision Essential, and Also More Mechanical Work

It is estimated that defects common to gray-iron castings are the direct cause of the rejection, or loss, of at least 5 per cent of the iron castings produced. This estimate on the average, however, is low. If this loss were eliminated many foundries struggling for existence to-day could net a profit on their operations.

What constitutes defects is a question of great importance. Different consumers using castings of a similar nature for the same purpose frequently will have widely varying requirements. The line differentiating sound from defective castings is drawn at different points. In this respect every consumer is a law unto himself, and there really is no standard for casting quality. Each consumer fixes what he considers a standard for his own requirements which he believes is adequate to his needs.

Ninety per cent of all defects can be attributed to incompetency and carelessness. However, since it is exceedingly difficult to obtain competent and careful labor, the casting operations must be safeguarded and simplified. Classifying casting losses in the order of their causes, it will be found that 50 per cent can be attributed to the sand and its treatment, 20 per cent to the cores, 10 per cent to the patterns, 5 per cent to equipment and 5 per cent to the iron.

SAND AS A CAUSE FOR DEFECTIVES

The sand, and its treatment, is a more prolific cause of defects than all other causes combined. In three cases out of four, it is the cause of dirty castings; it causes the mold to cut and the castings to scab and blow. If a casting blows, it generally is attributed to the cores, the sand or its treatment, and its repetition is guarded against. The cause of the cut, scab or buckle, however, is not investigated carefully, notwithstanding the fact that such losses are deadly to profits. It is the small defect that causes the foundryman to stop and wonder if the casting will pass the machine shop. It might be pointed out in this connection that the little foxes spoil the grapes. A casting defective beyond question usually points out its own remedy, but the casting which is questionably defective is the most elusive. The remedy is not sought as earnestly or intelligently as that causing the larger defect, neither are the molders instructed how to prevent the causes of small defects as those which are more apparent. The casting that is almost good enough offers the most difficult problem and the cause of its defect, as a rule, cannot be determined readily.

SCABS, CUTS AND BUCKLES

Scabs, cuts and buckles come and go. They vary with the temperament of the man who wields the rammer and the vent wire and blossom forth with the use of too much water, too much finishing, too little venting and the use of improper sand. When the foundryman discovers a scabbed casting, he usually tells the molder to be more careful, or advises him that the mold was too hard or too wet, or whatever his judgment dictates, but how often does he examine the facing and the sand and employ every possible resource to secure better sand or to make mixtures that are more satisfactory? How often does he show the molder how to ram the mold, to vent or finish it? The foremen to-day believe they discharge their duty by merely telling the men what is patent to any one in place of personally instructing them how to avoid their troubles and to do their work right.

Poor or misused sand causes more defective castings than any other factor. It has a decided influence on the cost of the product and may be the means of establishing a reputation for high-grade or poor castings. It is the foundation upon which the entire foundry structure is built. Suitable sand means better and cheaper castings, lower losses and an easier shop to operate successfully.

PREPARATION AND USE OF THE SAND

Next in importance are the instructions issued regarding the preparation and use of the sand after its careful selection, consistent with its cost. Cheap sand frequently is the most expensive raw material that a foundry can buy. It must be mixed and tempered for the particular work in hand and this must have the attention of the supervising force. The molder then should be instructed in its use and if defects develop, he must be taught, although he may have pounded sand for 40 years. Not many realize that the cause of defective castings might be eliminated if they would start at the sand bin and see to it that the best possible sand is obtained and that the proper instructions are given regarding its use.

Too often instruction partakes of criticism, when the molder is called to the scrap pile where his defective castings are pointed out to him in no uncertain terms. In most instances, what should be well-intended instruction is mere denunciation. Any one can find fault. The average molder does not lose a casting on purpose. He feels regretful over its failure, but does not always know the underlying cause of defects, nor how they may be overcome. He needs help, not hell, which he usually receives. He must be taught the rudiments of the business over and over again, since the conditions of the trade are changing constantly. This is the remedy that must be applied by the supervising force before the defective losses can be reduced. If the same energy is expended in instruction as in condemnation, far more satisfactory results will be achieved.

DIRT ANOTHER CAUSE OF DEFECTS

Dirt ranks as the second prolific cause of defective castings. From a molding standpoint, the casting may be perfect, yet it is dirty in the rough, or it may display dirt spots in the finishing operations. The number of excuses attributed as the causes for dirty castings is legion, yet only two can be assigned for this defect. Either the iron does not lie quiet in the mold, or against the cores, or dirt has been permitted to enter the mold with the iron, or was in it at the time when the metal was poured. Once in a while the blacking may wash; again the gates will cut, but more often the dirt can be attributed to the same cause as that of the scab or buckle, namely, improper sand, or its improper treatment. A casting will not be clean when the iron does not lie quietly in the mold. The metal may not boil or agitate sufficiently to cause a scab, yet its effect is apparent on the finished casting. If the slag which accumulates on top of the iron is permitted to enter the mold the casting, of course, will be dirty and this is true also if the gates cut or scab, or if the gates or runners are improperly constructed, or are defective in any way.

*From a paper presented before the American Foundrymen's Association, Atlantic City, Sept. 29, 1915, by Herbert M. Ramp, president of the Elmwood Castings Company, Cincinnati, Ohio.

It is possible to make a perfect mold, yet if the gates are improperly made, the casting will be dirty and will prove defective. Here again the remedy is care and supervision.

DIRT AS AN EXCUSE

An excuse generally offered for defectives is dirty iron. This is the bulwark behind which the molder hides and is the shield which he employs to cover his shortcomings. It might be well to direct attention to the fact that iron and dirt are enemies and have nothing in common. It is the foreign substance that occurs or forms on the upper side of finished castings. Iron and dirt have no affinity and are of widely different specific gravities. Ninety per cent of the so-called dirt in castings is composed of silica, alumina and magnesia and none of these is mixed with iron mechanically. Some of the different oxides contain iron, being formed while the iron is in a liquid state and subjected to the action of the oxygen in the air. These oxides also are classed as dirt. This dirt, however, the same as any other refuse that rises to the surface of the metal in the ladle, must be skimmed off before pouring and does not form a part of the iron. Oxides cannot form, however, after the casting is poured.

Iron is unlike most of the non-ferrous metals, in that it will form only a comparatively few combinations with the exception of those produced in the blast furnace. It repels all but a few elements that are taken up in almost constant proportions and these only at extreme temperatures. Regardless of the composition or the character of the iron, if it is melted and poured fairly hot, it will be clean. The sulphur may be 0.05 or 0.20 per cent, the manganese may be 0.20 or 2 per cent, the phosphorus may be 0.10 or 1.25 per cent, but none of the varying contents of these elements will make iron dirty in the castings. The iron may be too hard, too soft, too open; it may shrink, crack, draw or warp, but dirt is not its inheritance, nor its progeny.

During the past 25 years, the author has had direct charge of the mixing and melting of more than 500,000 tons of iron, but he has yet to find dirty iron in the sense assigned for it by the molder. Why does a molder make nine castings good and one bad? Why does a molder make a clean record for 30 days and then lose everything he makes. If a molder can produce 20 good castings, should he be unable to make 21 or 200? These are the questions put up to the foundryman every day and he has yet to give a convincing answer. First of all, there are no standards or set regulations governing foundry work. The sand may be wet down more one day than another and this makes different the ramming, venting and finishing problem if the castings are to be good. The iron may be colder and duller one day than another, and this would necessitate the use of gates of different size, or different pouring arrangements and the cores may be swelled out of shape, which would require different methods of securing. The flasks may be worn out and finally give way and a hundred other conditions may arise which never are the same on subsequent days.

INEXPLICABLE FOUNDRY PROBLEMS

Little has been done in most shops to remove the many causes of defective castings, except in foundries specializing in a particular class of work. No effort has been made to catalog the ills of the foundry and no one has attempted to place the foundry business on a level with the machine shop. If this were done, many and marvelous changes would be made. The patterns, core boxes and flasks would be inspected daily, the sand would be prepared by machinery and the different grades and ingredients would be carefully measured; different rules would be laid down covering the pouring temperature of the metal, as well as the methods of gating. The foundryman would have a voice in the design of the patterns and he also would have the patterns made, not the cheapest way, but the most satisfactory way for foundry use. Every possible pattern would be mounted on a molding machine instead of placing so much dependence upon the skill of the individual operator. Either by lectures, by a school course, or through technical papers, would be imparted to the molders the knowledge gleaned by the employers as the result of the development of the business. Premiums would be paid for high-grade service and efficiency.

The foregoing and many more factors would contribute as remedies for defective casting losses. Unfortunately, these needs cost money and the trail has to be blazed; some must be pioneers in elevating foundry practice to a class where definite standards exist and where definite practice will produce definite results.

THE PERSONAL EQUATION

In a large measure the personal equation will have to be limited and particular jobs will have to be so safeguarded that if Tom Jones lays off a day, his substitute won't make 50 per cent scrap; that if Mike Murphy has been out the night before, he won't spoil his day's work; or, if a molder has sickness at home, he won't forget some minor detail and ruin his casting. More of the responsibility, judgment and skill must be taken away from the individual and the work must be placed upon a higher mechanical basis than it is to-day. Then, only, will the beginning be made for the elimination of defects in castings. An honest comparison of the defective work of the ordinary jobbing foundry with that of the shop equipped for a special line of work, proves conclusively that defectives can be reduced by placing operations on a higher mechanical plane.

The purchase of the business of the Southern Railway Supply Company, St. Louis, Mo., has been completed by a new company, of which John C. Reed, formerly with the Shapleigh Hardware Company, St. Louis, is head. Among others interested are W. D. Achuff and Ephron Catlin, Jr. The new company, which has not yet been named, but which will have $150,000 capital, will continue at 113 North Second Street, where it has an office and warehouse, with other warehouses elsewhere in the city. In addition to carrying a full line of miscellaneous supplies for railroads, mills, mines and industrial corporations, it will represent exclusively in the Southwestern territory the Buda Company, the E. F. Houghton Company and the Verona Tool Works. It will also be exclusive agent in the United States for the Saunders corrugated car stopper.

The gross profits of the Fried. Krupp Steel Works, Essen, Germany, for the fiscal year ended June 30, 1915, were 113,229,821 marks against 54,004,571 marks for the fiscal year ended June 30, 1914. The net profit was 86,465,611 marks against 33,904,224 marks a year ago.

Because of the demand for structural material, the Illinois Steel Company has been obliged to put into operation, after an idleness of some three years, the 22-in. mill in its Bay View plant at Milwaukee, Wis.

ESTABLISHED 1855

THE IRON AGE

EDITORS:
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How Not to Stop Dumping

What stands out beyond all else in the proposal of the Administration to deal with the dumping evil, as outlined in Secretary Redfield's annual report, is that a journey has been made to the ends of the earth to find a way of handling this question without touching the tariff. Canada is known to have an effective method of dealing with dumping and there was an indication at one time that a similar measure would be recommended to Congress as a means of protecting American manufacturers against unfair competition from abroad. Canada penalizes shipments into its borders of products invoiced at less than the market prices in the country of origin, by an extra duty. Secretary Redfield goes to Australia for a plan but little used there and thus far quite experimental, which treats dumping as unfair competition to be enjoined by an appeal to the courts, with forfeiture of the undervalued goods where undervaluation is proved. The terms of the Australian act, moreover, are so vague as to make it a fruitful breeder of litigation. Who could determine, for example, what is meant by "fair profit," "fair foreign market value" and "fair selling value"?

It is not difficult to see the United States involved in endless disputes with foreign powers over the confiscation of goods shipped to this country which an American court decided were undervalued. But the proposed plan goes farther. It would make it unlawful "to sell or purchase articles of foreign origin or manufacture where the prices to be paid are materially below the current rates for such articles in the country of production, in case such prices substantially lessen competition on the part of the American producers or tend to create a monopoly in American markets in favor of the foreign producer." The administration of such a law would involve prodigious expense and difficulty and the grave penalties proposed, if really enforced, would lead to determined contesting of court decisions and ultimately to reprisals by other countries. The suggestion that the foreign representatives of the Treasury Department and the Department of Justice be given "such added powers and increased personnel as they may need" for gathering data abroad for the trials of such cases, if effectively carried out, would only make such representatives an offense to foreign governments.

Nothing less than a hydrophobic aversion to a tariff increase is back of the proposal of prosecution and confiscation to correct a trade evil which is as old as the levying of customs duties. The administration of Canada's anti-dumping law, as American manufacturers can testify, has actually checked dumping. The hazy Australian statute, with the weakness of all laws having penalties out of proportion to the offense, would furnish a constant incentive to lax enforcement. The motto of its Washington sponsors might almost be, better that nine dumped shipments get in from failure to prove an "intention to injure or destroy American industry" than that one American duty should be raised and thus adequately protect a home industry against destructive foreign competition.

No Check to Rising Prices

The steel trade is now experiencing the runaway market of which indications appeared early in November. Prices are sharply advancing on almost every class of finished product and it is becoming quite difficult to determine precisely what the market may be from day to day. Buyers who failed to take heed of the conditions prevailing in the autumn, and who did not cover their requirements for any considerable time ahead, are now finding themselves compelled to beg manufacturers to take their orders and are often turned down even though they offer good premiums above what may be considered regular prices. This state of affairs has, of course, been largely brought about by the heavy influx of export business, but it is also partly due to the improvement in general trade.

The situation in the steel trade is completely different from anything previously experienced in this country. No precedent, therefore, exists to enable comparisons to be made. We have seen times of great activity but at such times the heavy demand was due exclusively to urgent buying by our own people after a protracted period of under-consumption. Never before was there a heavy demand from abroad coupled with a recovery of confidence among our own manufacturing consumers. There is further an absence of any balance to the trade as no producing interests are in position to name comparatively low prices for future delivery and thus set a maximum on the upward movement of the market. It is of interest in this connection to note that for a long time our producers discriminated in favor of home buyers, quoting lower prices to the latter than to those whose purchases were

intended for use by the European belligerents. But domestic buyers are fast being brought up to the level of the foreign purchasers.

The statesmen and leaders of public opinion who a few years ago conducted a successful campaign against the cultivation of co-operation among steel manufacturers can study the present situation with some intellectual profit if they do not altogether derive satisfaction from it. For a considerable period, when prominent steel interests were co-operating, every effort was made in times of great activity to keep prices within bounds and thus make them reasonable for all parties concerned. The purpose of co-operation was to make trade steady, so that on the one hand prices would not go down to completely unprofitable levels and on the other hand that they would not rise to an exorbitant height. Their efforts were appreciated by probably the majority of those interested in the manufacture and distribution of iron and steel products, but, of course, they were not appreciated by those who knew nothing about trade conditions.

We are now reaping the consequences of a condition of trade "freed from its shackles." No manufacturer endeavors to keep his prices down, because others are also trying to stay the flood, but if he has anything to sell he gets the best price possible for it. This may make consumers complain of high prices, but they have no recourse except to abstain from the use of articles thus made dear. The farmer who uses wire fencing and other wire products cannot turn to his friends in Congress and ask them for relief, because there is no chance for relief through outside pressure. We have no trusts in the steel trade, combinations have been completely swept away, and not the merest attempt can be found at co-operation, and thus in that direction no opportunity is open for an attack on the methods of the trade. Further, no relief can be found through the operation of tariff revision because there is no duty on wire products. Everything has been done to give the farmer cheap wire, but at a time like this all such attempts at the regulation of economics prove useless. It is fortunate indeed for the Southern cotton planter that he does not buy cotton-ties at this time of the year. Possibly, however, the very active demand for iron and steel may run through the cotton-tie buying period next year, and in that event the Southern planter also may taste the fruit of a completely uncontrolled steel trade. It would be a somewhat bitter, but perhaps salutary, lesson in economics if he should be compelled to pay two or three times as much for cotton-ties as he did in the good old days when combinations prevailed and his interests were regarded considerately by the steel manufacturers.

Increasing Iron and Steel Capacity

Very likely we shall soon be hearing the "note of warning" that iron and steel making capacity in the United States is being increased too rapidly. There has been a long abstention from new construction of any moment, and the new construction items that appear from week to week are impressive by comparison. Much will be made of the fact that no iron and steel making capacity has been injured in England, Germany or Austria, practically none in France, and very little in Belgium.

The large quantity of steel being shipped by the mills for purely domestic consumption is hardly appreciated at its full measure. War demand for steel, or even export steel demand as a whole, is by no means the mainstay of the steel mill position at present. The detailed statement of October exports, given in THE IRON AGE last week, contained only a trifle over 300,000 tons of finished steel products, the remainder of the 351,128 gross tons recorded for the month being in scrap, pig iron, castings, etc. The output of finished steel in October was doubtless in excess of 2,300,000 tons, so that the direct exports of finished steel represented no more than about 13 per cent of the production. The finished steel involved in indirect exports, including shells, freight cars, locomotives, machinery, etc., can hardly have been as much in addition, so that with the steel mills producing steel at a rate 20 per cent greater than their average production in 1912 and 1913 less than 25 per cent of the product is involved in the export movement, direct and indirect. The shipments to the domestic trade, in other words, were not much less than the total shipments in the last two years of moderately full production. It should be noted also that on account of the freight congestion between the Central Western steel mills and the seaboard the mill shipments for export are doubtless at a lower rate now than in October, but total shipments have not been curtailed in consequence. The shipments to the strictly domestic trade are merely increased correspondingly, and the buyers are very glad to have the additional tonnage. Thus the volume of possible domestic demand must be given a new rating. The consumptive requirements increase with the growth of the country, even though they are not expressed in orders for so many tons each month or each quarter. Demand may grow while it sleeps, in other words.

A slip may be made in endeavoring to rate the significance of new construction of blast furnaces and steel making and rolling equipment by comparing the tonnage involved with old-time standards. This is now a 38,000,000-ton industry, measured either in pig iron or in steel ingots, and increases in capacity should be measured by that yard-stick. For many decades pig-iron production doubled on an average once in ten years. It was then not a matter of tons, but of percentage.

It is a conservative estimate that in the six years from the end of 1901 to the end of 1907 pig-iron making capacity in the United States increased from 18,000,000 to 28,000,000 tons, or by 55.6 per cent. That was an annual rate of increase of 8.5 per cent. A similar percentage rate now, based on 38,000,000 tons, would mean 3,250,000 tons a year, or more than a score of new blast furnaces a year. The new construction now on the boards represents barely more than one-third of that, yet in the long run blast furnaces are not productive within a twelvemonth of the time they are first reckoned as making part of the existing new construction program.

In the same period as was cited for the pig-iron comparison practically the same percentage increase in steel ingot capacity occurred, so that a corresponding observation can be made as to steel making capacity. There is little prospect that steel making capacity will increase at the rate of 3,000,-

000 tons a year. The country is large and the industries, both producing and consuming, are large. Increases in capacity must be gaged accordingly.

CORRESPONDENCE

German Post-Bellum Competition Not to Be Feared

To the Editor: Some of us reason that German labor will be deteriorated as well as decimated by the war, and this fact, added to increased costs through increased taxation, will give us an advantage over the Germans in business that we have hitherto not enjoyed. Others again, and these by far the more numerous, look for a keener competition from her on account of her necessities, and her lost customers. Nobody appears to have considered the possibility that there will be no change whatever in this matter of German competition, except it be the student in political economy like the writer of this letter, who, of course, may easily be wrong. But it seems plain that so long as gold is free to flow from one nation to another, no nation can undersell other nations in everything and as a regular steady performance, although this can be done, of course, in particular things for which one country has a special or local aptitude. For in the exports of the particular things in which one country has a natural advantage or an acquired skill or experience, it will get its pay in imports of other commodities in which other nations in their turn excel. If one country excelled in everything and undersold everybody its pay, of course, would have to be in gold, but not for long. In a very brief period this segregation of gold in her borders would cause a rise in her prices and a corresponding fall in foreign prices until an equilibrium in price had been reached, and even after that her prices would be up and it would be imports of commodities that would have to pay for her exports, however cheaply she started out to sell and however willing she might be to keep it up. There will be a mighty flood of imports into this country after Europe gets back to honest toil, but in deferred payment of our present equally great exports and not because of any advantage in competition.

So in a general way it would seem that there is nothing to fear from German competition, no matter how low Germany cuts her profits. Nature protects us except in dyestuffs and toys and a few other particulars; and in these we should not want any protection and should be glad to take advantage of her patiently acquired skill on the same principle that it pays a machinist better to take advantage of a shoemaker's skill than to drop his work to acquire that skill himself.

The fact should never be overlooked that our purchase of her specialties gives us a market for our own specialties that we otherwise would not have, since it is imports that must pay for exports, and not gold or securities in the long run and as a steady thing. An import is a good thing. It means business. It means an export. To the student in political economy it seems that although the American steel maker understood his business in going in for high tariff in the past, he is to-day not aware of the fact that conditions have changed, and what blinds him and makes a stationary stand-patter of him is mainly labor costs. He cannot take the time to study out that high labor costs are due to two things, neither of which hampers him in competition with the foreigners under normal conditions. Of natural advantages—ore deposits, locality, etc.—the benefits are absorbed by labor, but obviously without actual disadvantage to capital in competition any more than high rent is a disadvantage to the Broadway merchant in competing with the suburbs. The high rent represents a natural advantage over the suburban merchant. But the other cause of high labor, an unnatural gold segregation brought on by high tariff, certainly is a disadvantage in the matter of foreign competition. It plays the mischief with the exporter and without helping the home marketer or the laborer any. For high prices and wages through currency inflation become a cheerless mockery both to labor and capital. But this form of high labor cost, of course, promptly disappears with the disappearance of the cause—gold segregation from high tariff.

We now have an abnormal gold segregation from foreign war, which at the end of the war will make our prices away up above foreign prices until the gold can slump back to Europe, which it will do with a swiftness that will be bewildering and that will leave nothing of our strong bank position but a pleasant memory.

GEORGE AUCHY.

Tacony, Philadelphia, Dec. 17, 1915.

Again, What Is Vanadium Steel?

The communication to THE IRON AGE in the issue of Oct. 14, 1915, headed "What Is Vanadium Steel?" has attracted some attention in England. Commenting on the litigation in the case referred to the London *Ironmonger* concludes an editorial with the following testimony, which apparently is from J. Kent Smith:

An authority, who was one of the pioneers in the commercial application of vanadium and who is responsible for much of the literature of the subject, informs us that in his view it is a mistake to try to estimate the percentage loss of vanadium added. Apart from mass action, which of course must have some influence, the remaining loss due to removing oxygen and nitrogen is more or less a constant in good practice, although for a usual addition of vanadium for castings this constant will vary among different works.

In good acid open-hearth practice, where the metal is well finished and thoroughly "manufactured" in the furnace, the vanadium loss should not exceed 0.05 per cent. In good basic practice, where the metal is well finished and "manufactured" in the furnace and the vanadium added in the ladle, the loss would much more nearly approach 0.1 per cent. Percentages should be reckoned on the finished steel and not on the vanadium added; thus the addition of 6½ lb. of vanadium alloy to 1600 lb. of metal is the same thing as the addition of 0.406 per cent. If the alloy be 33.3 per cent this equals the addition of 0.135 per cent vanadium. If 0.135 per cent vanadium be added in the acid open-hearth bath in excellent practice, the steel tapped would be expected to contain 0.085 per cent vanadium. In first-class basic practice the steel would be expected to contain 0.055 per cent vanadium, though this percentage might easily be only 0.035 in some basic charges, as there is a greater amount of impurities to eliminate.

If this amount of vanadium were added to a steel which had not been properly worked down and finished with manganese, one would expect to get no vanadium at all and probably an enormous number of blowholes in the resultant castings.

So far there is no recognized standard vanadium cast steel. The only sensible way, in the opinion of this authority, to make a specification is to indicate in it the amount of vanadium with which the steel is to be treated under proper conditions, which latter phrase can be amplified by a definite chosen abstract from some of the authoritative works, published on the subject. A further safeguard is to specify the amount of vanadium required in the finished steel. A well-known Sheffield firm, for example, states that when vanadium steel is ordered a steelmaker should clearly understand that a content of 0.15 to 0.20 per cent of vanadium is required in the finished material, and that when a customer has an idea of what he requires he should state the quantity he wishes.

The Illinois Steel Company recently placed with the Alliance Machine Company, Alliance, Ohio, an order for 71 cranes for the plants at South Chicago and Gary. Among the number are four 175-ton four-girder ladle cranes, eight 100-ton four-girder ladle cranes, four 150-ton screw type strippers, four 7½-ton open-hearth charging machines and four 15-ton slab-charging machines. The total shipping weight of the 71 cranes will be 7500 net tons and the total horsepower of all motors required for their operation will be approximately 12,500.

The Atlantic Steel Company has succeeded the Atlanta Steel Company in the manufacture of nails, wire, hoops, cotton ties, bars and spikes at Atlanta, Ga., the change having taken place on Dec. 8. The old company is in existence for the purpose of winding up its organization.

Activity in Shipbuilding

WASHINGTON, D. C., Dec. 21, 1915.—The private shipyards of the United States now have under construction or contract the unprecedented total of 761,511 gross tons of merchant vessels. Of these, 451,422 tons, or 60 per cent, has been contracted for since July 1 of the present year, according to statistics just compiled by the Bureau of Navigation of the Department of Commerce. The construction in the current fiscal year promises to surpass previous records, but will probably be materially exceeded in turn by the output of the fiscal year 1917. In view of the decidedly adverse effect on American merchant vessel owners of the so-called seamen's law and the constant threat of governmental competition in one form or another, the volume of new construction would seem to be a very conclusive answer to the oft repeated declaration of the advocates of Government ownership that private capital has demonstrated its inability to cope with the existing water transportation problem.

The tonnage now under contract in American yards includes 202 vessels, of which 98 are ocean-going vessels of over 3000 tons each, 19 ranging from 3000 to 4000 tons, 10, from 4000 to 5000 tons, 36, from 5000 to 7000 tons, 20, from 7000 to 10,000 tons and 13 exceeding 10,000 tons each.

The following table shows the number of vessels and total gross tonnage under construction or contract on Dec. 1, 1915, by yards:

Merchant Construction and Contracts

	No.	Gross Tons
New York Shipbuilding Company, Camden, N. J.	22	120,773
Fore River Shipbuilding Corporation, Quincy, Mass.	8	45,000
William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa.	13	78,900
Pusey & Jones Company, Wilmington, Del.	5	1,384
Baltimore Dry Dock & Shipbuilding Company, Baltimore, Md.	6	14,828
Maryland Steel Company, Sparrows Point, Md.	14	70,850
Harlan & Hollingsworth Corporation, Wilmington, Del.	15	65,752
Newport News Shipbuilding & Dry Dock Company, Newport News, Va.	19	132,093
Chester Shipbuilding Company, Chester, Pa.	3	14,000
Ellicott Machine Corporation, Baltimore, Md.	3	750
Staten Island Shipbuilding Company, Port Richmond, N. Y.	11	3,264
Skelden Shipbuilding Company, Baltimore, Md.	1	(a)
Union Iron Works, San Francisco, Cal.	12	81,174
United Engineering Works, Oakland, Cal.	1	3,500
Seattle Construction & Dry Dock Company, Seattle, Wash.	2	7,800
American Bridge Company, Pittsburgh, Pa.	16	10,530
Toledo Shipbuilding Company, Toledo, Ohio.	7	17,900
American Shipbuilding Company:		
Lorain yard	5	34,800
Cleveland yard	2	4,200
Detroit yard	4	8,400
Chicago yard	1	2,100
Chicago Shipbuilding Company, Chicago, Ill.	1	(a)
Great Lakes Engineering Works, Detroit, Mich.	14	36,780
Manitowoc Shipbuilding Company, Manitowoc, Wis.	5	3,000
Bath Iron Works, Bath, Me.	1	300
Moore & Scott Iron Works, Oakland, Cal.	1	222
Clinton Shipbuilding Company, Philadelphia, Pa.	1	560
Dubuque Boat & Boiler Works, Dubuque, Ia.	2	525
Charles Barnes Company, Cincinnati, Ohio.	1	300
Great Lakes Towing Company, Cleveland, Ohio.	4	332
Johnson Bros., Ferrysburg, Mich.	1	94
Howard Shipyards Company, Jeffersonville, Ind.	1	1,400
Total	202	761,511

(a) Tonnage not reported.

The total strength of the United States merchant marine on Dec. 1, 1915, was 26,888 vessels, aggregating 8,443,258 gross tons. Up to that date the total flag transfers under the American registry act of Aug. 18, 1914, included 171 vessels, aggregating 583,733 gross tons. The total number of vessels available for transfer under the act has been variously estimated at between 750 000 and 1 000 000 tons. The rapidity with which vessel owners have sought to take advantage of this law, however, has been materially reduced by the passage of the seamen's act and, in view of the enormous demand for charters since the beginning of the current fiscal year, it is significant that only twenty-three vessels have applied for American registers.

W. L. C.

The Lima Steel Casting Company, Lima, Ohio, successor to the Crucible Castings Company, is building an addition, 80 x 160 ft., and is installing a converter to supplant the present crucible process.

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Why the Timidity of Business?

The *Bache Review*, New York, has the following concerning one phase of present conditions which may be lost sight of in the pell-mell of war orders:

"The President's speech at Columbus late last week touched upon American business and the future of that business. It was intended to be reassuring. He deplored the timidity of American business men in striking out for foreign trade in past years, and attributed it to provincialism. Some American business men, he said—not a few—who were not built upon the provincial type, did find their way into foreign markets and made the usual American peaceful conquest in those foreign markets, but others seemed deliberately to have refrained or not to have known that there were opportunities to be availed of.

"One, the greatest of these, which found its way to foreign trade, was the United States Steel Corporation. And what is its reward? The Attorney-General is trying to break it up, to dissolve it into constituent parts and to deprive it of the splendid efficiency under combination which has made it possible to carry its enormous trade beyond the seas.

"What of the Harvester trust with its immense foreign trade? This, too, notwithstanding decisions in lower courts against the Government, is still being prosecuted.

"If anyone wants to know the cause of business timidity he should look to Washington."

THE NEW STEEL MERGER

Indications that the Youngstown-Cambria-Lackawanna Consolidation Will Be Made

Predictions are now made that the proposed merger of the interests of the Youngstown Sheet & Tube Company, Cambria Steel Company and the Lackawanna Steel Company will be carried out and will become operative about Feb. 1. It is stated that the New York bankers who intend to underwrite the securities of the new company have given J. A. Campbell, president of the Youngstown Sheet & Tube Company, full power to carry out the plan on lines recently decided upon. Holders of about 75 per cent of the common stock of the Youngstown Sheet & Tube Company have agreed to the merger, and it is said options have been secured on more than a controlling interest in the stock of the Cambria Steel Company at $80 per share. There are a few important holders of Cambria stock, apart from the two well-known groups, whose stock is not yet available, and this is a factor of some moment. It is not known yet what arrangements can be made with stockholders of the Lackawanna Steel Company, but negotiations are under way. A statement given out by J. A. Campbell at Youngstown contains the following:

"The meeting held Tuesday was an informal gathering of the stockholders and the action taken was but preliminary to the actual details to be worked out, but it was of a significance to assure the carrying out of the plans of the merger with only the agreement of the stockholders of the Lackawanna Steel Company to be secured and I consider that as good as settled.

"It was thought best to thus secure the opinion and approval of stockholders before going forward with the spending of thousands of dollars in the securing of legal advice, other than has been employed, and the gathering of statistics other than necessary to explain the plan. From the beginning the effort was made to secure for the merger plants which by location and in character of product did not come into close competition and sold products largely in different territories. It was for this reason largely that the Republic Iron & Steel Company was not considered in the negotiations for the merger. As worked out, the plants of the Sheet & Tube Company, the Lackawanna and the Cambria steel companies appeared to offer the best opportunities and conditions for inclusion in the merger and the details were worked out with these three companies as the nucleus for a new organization.

"It is not the intention to acquire or build a plant at the Atlantic seaboard as has been suggested, but it is possible that a plant may be acquired or built in the Chicago district and that other plants including a ship building and a car building plant may be acquired to add to the organization at some future time.

"The underwriting of the new organization, so far as the Sheet & Tube Company is concerned, has been taken care of and I suppose it will be handled as concerns the other companies.

"I do not think that Youngstown or Youngstown interests need have fear of the effects of the merger. I think when things work out they will have reason to be satisfied. The sales and purchasing departments will be located in this city with the executive offices in New York, but the operating offices will as heretofore be located at the several plants.

"It has not been decided what name is to be given the new organization, but my expectation is that operations under the merger will be started not later than Feb. 1."

The Atlantic Steel Castings Company, Chester, Pa., started up its new foundry about three weeks ago, and the operation of its new 5-ton acid open-hearth furnace has been successful beyond expectations. It has been possible to take out a 5-ton heat in 2 hr. and 30 min. from charging to tapping, insuring seven or eight 5-ton heats per day. The volume of orders is large, and none of it is war business.

Wickwire Company to Build Steel Plant

The Wickwire Steel Company, Buffalo, N. Y., has decided to build steel and wire mills of approximately 400 tons daily capacity, adjoining its blast-furnace plant on the Niagara River, near that city. The new plant will consist of open-hearth furnaces, a metal mixer, blooming mill, continuous billet mill, rod mill, wire mills for the manufacture of market wire and all heavy sizes of finished wire, factory for wire nails, etc. Construction is to be commenced as soon as possible.

In connection with the steel mill additions, the Semet-Solvay Company, Syracuse, has entered into an agreement with the Wickwire interests to erect a by-product coking plant on an adjoining site of 50 acres which it has recently purchased. A battery of 60 ovens will be built at once and the Wickwire Company will use in the operation of its blast furnaces a large proportion of the coke produced, although foundry and domestic coke for the general market will be made also by the Semet-Solvay Company. The Wickwire Company has also contracted to use in its new steel and wire mills the coke-oven gas made.

Barney & Smith Receivership Ended

The receivership under which the Barney & Smith Car Company, Dayton, Ohio, has been operating for some time was lifted on Dec. 15. A loan of $600,000 was negotiated and under the present plan there will be no change in the status of the bondholders and stockholders of the company. Early in the year the business of the company began to improve; later contracts were taken for shrapnel forging work, and extensions made by the receivers have doubled the capacity. In one department orders are sufficient to keep it operating until May 1. Steel car construction will become a more important factor in the company's operations. H. M. Estabrook is president, A. J. Stevens vice-president and general manager and J. F. Kiefoher treasurer. These with Lawrence Maxwell, E. J. Barney, J. L. Oneil, E. N. Patten and C. L. Harrison constitute the board of directors.

New 200-Ton Open-Hearth Furnace

The Phoenix Iron Works, Phoenixville, Pa., is constructing a 200-ton open-hearth furnace from which the metal is tapped into two ladles through a bifurcated spout under the Maccallum patents. The hearth is 42 ft. long and 15 ft. 9 in. wide. It is expected that this furnace will be making steel by March 1, 1916. It will be the fifth of this type, the fourth having been put in operation Sept. 1, 1915. The first furnace of this type was started in January, 1909, the second in October, 1909, and the third in September, 1911. An illustration showing the method of of tapping equal amounts into two ladles was given in THE IRON AGE, Oct. 20, 1910.

To Operate Diamond State Steel Plant

The Delaware Steel & Ordnance Company is the new corporation which is to operate the old plant of the Diamond State Steel Company at Wilmington, Del., now being reconstructed. It has been incorporated in an Eastern State with a capital of $10,000,000, par value $100. Daniel J. Driscoll and H. T. Wallace of the Delaware Seamless Tube Company, Auburn, Pa., are said to be of those back of the company. Operation is planned to begin in about two months, and blooms and steel rounds will be important products.

An exhibit of graphic methods of representation is to be held under the auspices of the National Bureau of Standards at the Hotel Raleigh, Washington, D. C., on Dec. 28 to 31, inclusive. The exhibit is intended to bring about an interchange of ideas as to the principles and applications of graphic methods among widely diversified fields and to popularize and promote the use of such methods. Henry D. Hubbard, Bureau of Standards, Washington, is chairman of the graphic exhibit committee, of which Willard C. Brinton, consulting engineer, New York, is a member.

For the Forfeiture of "Dumped" Products

Administration Balks at Any Plan Which Involves Raising the Tariff—Co-operation in Foreign Trade May Be Made Lawful

WASHINGTON, D. C., Dec. 21, 1915.—An authoritative statement of the Administration's program for legislation to prevent so-called "dumping" of surplus foreign products on American markets and to permit combinations of American manufacturers and exporters for the extension of their foreign trade is contained in the forthcoming annual report of Secretary Redfield of the Department of Commerce. Both of these important subjects have been referred by the President to the Federal Trade Commission, under whose supervision all laws with reference thereto that may be enacted by Congress will be executed.

CANADIAN PLAN NOT FAVORED

The original plans of the Administration to treat the dumping problem in the direct and highly effective manner adopted by Canada, which in a few short years has substantially ended the practice, have been abandoned, and it is now proposed to frame a measure on the lines of the Australian law which has been so infrequently invoked that it can hardly be said to have passed the experimental stage. Attempts to dump surplus foreign products in Canada on the basis of invoiced prices less than those at which similar goods are sold in the country of origin are promptly met with a penalty in the form of a countervailing duty, which immediately deprives the importer of the advantage he would have reaped from the low cost of the goods. The statute operates automatically and the practical experience of the customs officials in its enforcement has enabled them to gather a vast amount of valuable data regarding foreign costs of production, until at the present time little or no expense attaches to the administration of the law. The Australian statute, on the other hand, treats dumping as a form of unfair competition to be enjoined by an appeal to the courts, involving more or less delay and expense and depending for its outcome upon the development of facts not easily ascertained in a country in which manufacturing industries have not been largely established.

"DUMPING" IS "UNFAIR COMPETITION"

Under these circumstances those who have hoped that the Administration would recommend a simple and effective form of dealing with the dumping problem will be disappointed at Secretary Redfield's recommendations, which seem vague and hardly calculated to meet the emergency. It is significant that the Secretary carefully avoids the use of the term "dumping" and makes but a single reference to the tariff. He says:

"Unfair competition" is forbidden by law in domestic trade, and the Federal Trade Commission exists to determine the facts and take steps to abate the evil wherever found. The door, however, is still open to "unfair competition" from abroad which may seriously affect American industries for the worse. It is not normal competition of which I speak, but abnormal. It is a destructive type of the industrial struggle, intended to put out of being the forces opposed to it that the victor may exploit the field at will. The methods used are not those of legitimate commerce, but those of commercial offense. They aim not at development, but at conquest. When the war shall close, the public control of railroads in foreign lands, the semi-official chambers of commerce, the publicly fostered organizations which control great industries in some countries, will all exist and will all be used in an effort to recover lost commerce. The growth in the United States of industries which may menace large markets heretofore controlled from abroad will not be permitted if public and semi-public forces acting together in foreign countries can prevent it. The outreach of American industries, nay their very existence in our own land in some cases, will be resisted to the full and every stratagem of industrial war will be exerted against them. Expecting this, we must prepare for it. If it shall pass beyond fair competition and exert or seek to exert a monopolistic power over any part of our commerce we ought to prevent it.

So few would question the duty of restraining by means of the public power the unfair foreign competition of which I speak that the question may be said not to be whether we shall prevent such attacks but how they shall be prevented while welcoming, indeed promoting, that normal ebb and flow of legitimate commerce between our land and all others which will provide for our people the security against exaction which is insured by reasonable competition. In my judgment the matter is one which may more wisely be treated as an attempted wrong to be forbidden than as an economic matter which needs to be restrained. I should prefer, therefore, to deal with it by a method other than tariffs, classing it rather as an offense similar to the unfair domestic competition we now forbid. It seems possible that by using the existing machinery of the Treasury Department and the Department of Justice we may restrain this foreign "unfair competition" on both sides of the sea. I recommend, therefore, that such legislation be enacted as will give to the foreign representatives of the above-named departments such added powers and increased personnel as they may need for this purpose and that it be enacted if possible that merchandise sold in "unfair competition" or under circumstances which tend to create a monopoly in behalf of the foreign producer in American markets shall be forfeited.

I also recommend that legislation supplemental to the Clayton anti-trust act be enacted which shall make it unlawful to sell or purchase articles of foreign origin or manufacture where the prices to be paid are materially below the current rates for such articles in the country of production or from which shipment is made, in case such prices substantially lessen competition on the part of the American producers or tend to create a monopoly in American markets in favor of the foreign producer, and that it be made unlawful for any person to buy, sell, or contract for the sale of articles of foreign origin, or to fix a price for same or to make a rebate upon such price, conditioned upon the purchaser thereof not using or dealing in wares produced or sold by the competitors of the manufacturer or seller, where the effect is to substantially lessen competition in the production in the United States of such articles, or tends to create a monopoly in the sale of such articles in American markets in favor of a foreign producer.

CO-OPERATION IN FOREIGN TRADE

Combinations for the development of export trade are frankly urged by Secretary Redfield, who suggests that the anti-trust laws be amended to permit such pooling as may be desired, provided all American concerns wishing to do so may join in the movement. The Sherman law, the Clayton law and possibly the Trade Commission law now prohibit such combinations, hence a specific statute legalizing them must be enacted by Congress before American exporters will be free to follow the methods pursued by the German cartels, the French comptoirs and other foreign combinations. In this connection Secretary Redfield says:

I deem it of special importance that business concerns should be allowed to co-operate in foreign trade. The present law plays into the hands of the larger concerns and shuts out small ones from important markets. It may be said that small manufacturers could not in any case successfully enter the foreign field. This, however, ignores the fact that in many lines and specialties there are producers of moderate size abundantly able to compete as regards the cost and character of their products but unable to assume alone the considerable expenditure over a continued period that would be required to obtain a firm foothold in foreign markets for their somewhat limited products. Such a concern ought to be permitted to co-operate with another in similar or different lines in order to share the expense of introducing their goods abroad. There are lines of industry classified under one head in which the individual concerns may each make separate specialties though their general products are in common. Provision should be made whereby such concerns may, with due safeguards against monopoly, co-operate in the foreign field. To refuse this for any fancied fear of monopoly is to say that the large concerns shall alone hold

the lucrative foreign markets and that the far larger number of smaller houses with their many employees shall be shut out from them. Such a policy can commend itself to no one.

The whole matter should be placed under the supervision of the Federal Trade Commission and should be subject to full publicity. Either of these safeguards should be sufficient; both of them will certainly be so. It is, of course, not intended that this co-operation shall extend into the domestic field. It is as necessary that it shall exist as regards the foreign field as it is important that it should not go to excess in the domestic one. One should be done; the other avoided. Under the supervision of the Federal Trade Commission the necessary good can be accomplished and the unnecessary evil can be prevented.

CO-OPERATION IN ESTABLISHING BANKS ABROAD

Secretary Redfield strongly recommends the amendment of the national banking laws to encourage the establishment of a large number of small branch banks in those foreign countries with which American exporters are seeking to build up trade. The present laws operate to make it possible only for large banks of great power to undertake the important work of financing American commerce in foreign fields; in other words, the laws work in favor of the great banks and against smaller institutions, which desire to enter this field. The Secretary says that great credit is due those American bankers who have taken the first forward steps in establishing foreign branches. They are true pioneers of American commerce abroad. The work, however, is of such national importance that it should not be confined to any one or any few large institutions. It is not for their permanent good that it should be so confined. The country requires not one or a few, but numerous American owned banks abroad. There are many banks in the United States of less than major size, yet abundantly strong. These, Secretary Redfield contends, should be permitted, under proper safeguards, to act jointly in such matters. There could hardly be a single step in the fiscal world which at this time would be more helpful in establishing our commerce abroad on a firm basis. Several strong institutions have signified willingness to co-operate in establishing foreign banks if permission is given them by the law.

The Secretary calls attention to the fact that while the currents of the world's trade now flow strongly toward America they may not always so flow, for there are those whose interest it will not be to have them continue to flow our way. "This is not the occasion," he says, "for fear lest something happen somewhere and somehow which will not be pleasing to some one, but is the time for action, taking indeed every possible thoughtful step to safeguard that action, but remembering that action is the thing needed."

W. L. C.

Utilization of Blast Furnace Slags

Their Granulation and Chemical Composition—Effect of Sulphur and Other Elements on Reinforcing Materials—Commercial Slags as Concrete

E. C. Brown, chief civil engineer of the Carnegie Steel Company, read a paper on the "Utilization of Iron and Steel Works Slags" before the Engineers' Society of Western Pennsylvania at Pittsburgh on the evening of Dec. 7.

MODERN METHODS OF DISPOSING OF SLAGS

First, describing what slag is and the different kinds, Mr. Brown referred to the modern methods of disposing of slag and also of granulating it. The hot slag ladle is used at many furnace plants, especially the larger ones, and is essentially a big cast-iron pot, at first carried by a yoke supported on railroad car trucks, but now a more stable cast-iron or steel skeleton car body is employed to support the ladle and its accessories. The transportable pot or ladle thus formed has the necessary tilting mechanism, operated by hand, steam or compressed air, and the modern ladles have a capacity of about 200 to 260 cu. ft.

The cost of this type of equipment is heavy, both in original outlay and maintenance. The molten slag is run directly from the furnace by the cinder trough into these ladles, and hauled to a convenient dump, sometimes as far as eight or ten miles. The ladles are placed on a track on the edge of the dump and unloaded by tilting. With the modern air-dumped ladle this operation is quite expeditious. It requires only about two minutes per ladle, or from fifteen to twenty minutes to discharge the contents of a train of seven or eight cars. Usually the skull or hardened shell of slag slips from the ladle with, or immediately following, the liquid slag. Occasionally the skull tends to adhere to the iron pot, particularly if the latter has been cracked or is otherwise defective. It is usually easily forced out, however, by a few dashes of water thrown from a bucket and aimed at the point of contact between skull and pot. Manifestly, the higher the dump the more economical is this manner of disposition.

From slags thus or similarly deposited, the greater amount, perhaps, of the principal commercial slags are produced. It generally is left to cool and weather for several months, and is then excavated by steam shovel and crushed and screened to various sizes for use as ballast, concrete aggregate, road metal, roofing slag, filter material, etc.

GRANULATION OF SLAG

The granulation of slag destroys its dense condition and produces a light and more or less fine granular substance, resembling in appearance coarse sand. In this form the slag will weigh, perhaps, from one-fifth to one-third only as much, volume for volume, as when it is cooled naturally in mass.

There are two methods, essentially alike, by which this granulation is accomplished, the second method being rather an improvement of the first, or simpler one. This simpler method is that used at many blast furnaces, where the molten slag is run directly into a tank, or brick or concrete pit, partly filled with water, in which the disintegration of the slag is accomplished by simple contact with water. This product contains many light, fluffy particles in addition to those of finer and denser character, and much of it is as coarse as popped corn, which, when the color is light enough, it rather resembles. Owing to its great porosity, much of its floats until it becomes cold and saturated with water and only the denser particles settle at once to the bottom of the tank.

The second method, sometimes called "gun granulation," may be briefly described as follows: The molten slag is delivered from the furnace, through the ordinary trough or runner, to a concrete pit, at the edge of which the trough takes the form of a large nozzle, fitted with an annular ring, from which issues water in the form of spray delivered through a 4-in. pipe under pressure of from 30 to 40 lb. per square inch. This causes disintegration and partial cooling of the slag, which operations are further accomplished by the water which partly fills the pit, and by the force of the impact with which the slag is thus driven against the opposite wall of the pit. This product is considerably more dense and heavy than that of the method described above and has been used to some extent as a substitute for sand in concrete work. A modification of this method is the introduction of a jet of air or steam under high pressure, and the use of little or no

water. By further modifying the apparatus a substance, very much like commercial mineral wool, has also been produced experimentally.

THEIR CHEMICAL COMPOSITION

In speaking of the chemical composition of slags, Mr. Brown said that notwithstanding considerable variation in both the chemistry and the physical properties of blast furnace slag, there is a fair degree of uniformity in this material. The differences which exist are due partly to the variation in chemical composition, but probably equally to physical causes or methods of operation and treatment. Generally speaking, calcium and magnesia together form approximately 50 per cent, while silica and alumina make up most of the remainder of our slag. Typical analyses of blast furnace slags from lake ores under hot-blast practice, are as follows:

	By Campbell	By Carnegie Steel Company	
	Per Cent	Per Cent	Per Cent
Silica	35.55	35.00	35.22
Alumina	12.05	15.00	13.68
Calcium	40.52	44.60	43.00
Magnesia	8.86	2.60	5.74
Iron oxide	0.68	0.50	0.49
Sulphur	1.66	1.60	1.61

There are, of course, due to variations in the fluxes and ores, rather extreme variations in analysis, but generally we are not interested in them in considering the slag problem from an utilization point of view.

EFFECT OF SULPHUR ON REINFORCING METALS

In this connection it may be wise to refer to the question which has been raised by some engineers and others, as to the effect of sulphur or other elements, such as magnesia in slag, which might prove injurious to reinforcing metals placed in slag concrete or which would produce injury through chemical action as by expansion. We may say that practically all of our blast-furnace slags are decidedly basic in character, there being almost always present some excess of free lime and the small amounts of sulphur which occur, the chemists say, are present as sulphides only, and are, therefore, harmless to metal. As a practical matter, there are numerous instances on record where anchor bolts and other forms of iron or steel, imbedded for reinforcing or other purposes in slag concrete, have been removed after several years and found to be in perfect condition, no corroding or other injurious influence having affected them.

USES OF COMMERCIAL SLAG

In referring to the nearly 1,000,000 tons of slag and miscellaneous material sold last year, Mr. Brown stated it was distributed as to use about as follows:

	Tons
Cement	375,000
Railroad ballast	250,000
Road work	195,000
Concrete	65,000
Other uses	60,000

Perhaps the most extensive use of commercial hard slag to-day is in road improvement work in which it has given most satisfactory results. This is so whether in plain water bound macadam or in combination with tars, asphalts or other special binders. The best concrete road the speaker saw on a recent extensive trip of inspection through a portion of a neighboring State was laid with slag concrete. Several of these roads have been in service from two to five years and are wearing well.

AS AN AGGREGATE IN CONCRETE

As an aggregate in concrete for all general purposes, slag has been most thoroughly tested and is far beyond the experimental stages. It has gone into all kinds of buildings, walls, bridge work, light reinforced structures, as fence posts and telegraph poles, floors, roof slabs, and in fact into practically everything for which concrete of any kind is suitable. In not a few classes of construction it is especially well adapted because of its relative lightness, good bonding qualities and perfect fire-resisting nature.

An average commercial blast furnace slag has a specific gravity of about 2.62; limestone averages 2.60; granite, 2.68, and trap rock, 2.96. Slag is of a grayish color, breaks with decided angularity, is somewhat porous, and weighs commercially approximately 2000 lb. per cubic yard. Of these qualities, perhaps the most important, or at least the most conspicuous, is its porosity, which may be more properly characterized as a cellular construction. This accounts for its relative light weight, both in the natural fragment and in combination, as, for instance, in concrete. The weight of some of the forms of blast-furnace slag is as follows: Crushed and sized bank slag, as ordinarily produced and shipped, weighs 1900 lb. to 2100 lb. per cubic yard, probably 2000 lb. is very near the average. Granulated slag varies greatly, probably from as low as 800 to 900 lb. to as high as 1500 to 1600 lb. with an average of 1300 lb., both fineness and moisture greatly affecting the weight.

Continued Success of Profit Sharing

Mention was made in THE IRON AGE, May 7, 1914, of the profit sharing plan inaugurated by the Clipper Belt Lacer Company, Grand Rapids, Mich., on Jan. 1, 1913. The plan has been continued up to the present time, and the company states that it is working out very satisfactorily as well as being appreciated by the employees. Another feature, that of group life insurance, will be added to the welfare work of the company for 1916.

Everyone connected with the company, including traveling men and the office and factory forces, is covered by the policy issued to the company. On Christmas Eve when the profit sharing checks are distributed to the employees, each of them will receive an insurance policy for at least $1,000 on which the premium has been paid by the company for the year 1916. The higher employees of the company will, of course, receive policies for amounts larger than $1,000. In the event of the death of an employee and a subsequent disagreement as to the beneficiary, the Clipper Belt Lacer Company is to decide to whom the money is to be paid, it being impossible for the company to convert it to its own use. Should any employee leave he will have the privilege of carrying the insurance without further examination by paying the regular rate for his attained age.

The company has erected a two-story office building 70 ft. square, which it plans to occupy on or before Jan. 1. The building is of fireproof construction, nothing but steel, tile, brick and concrete being employed, and it is provided with automatic sprinklers throughout. The office and the shipping room will be located on the first floor and a storage space is provided on the second.

Panama-Pacific Exposition Awards

The following announcements of awards of medals for exhibits at the Panama-Pacific International Exposition have been received since the appearance of the list in THE IRON AGE, Dec. 9:

The American Swiss File & Tool Company, 24 John Street, New York City, received a medal of honor for its exhibit of files.

J. H. Williams & Co., Brooklyn, N. Y., received a grand prize for its exhibit of tool holders, lathe dogs, C clamps, crankshafts, hoist hooks, chain pipe wrenches and vises, drop-forged wrenches and eye bolts, wire rope sockets and drop-forged tools, instead of the medal of honor for drop forgings and drop-forged tools, as announced in THE IRON AGE, Dec. 9.

The Heald Machine Company, manufacturer of grinding machines, Worcester, Mass., announces that it has sold its complete line of drill grinders, including patents and rights to manufacture, to the LaSalle Machine & Tool Company, LaSalle, Ill., which will continue to supply the trade. For some time the Heald Machine Company has been unable to devote as much attention and energy to the sale and manufacture of its drill grinders as the line warranted, because of the greatly increased business in larger machines. It was therefore decided to turn the line over to some responsible manufacturer who could devote to it the requisite time and energy.

An Inspection Department in a Foundry*

Result of Its Application to a Plant Making Automobile Castings—The Cost and Some of the Advantages

BY C. B. WILSON†

The relation between inspection and the final cost of castings is a subject which can be discussed at great length, since a properly organized and efficient inspection department is a more potent factor in reducing the scrap loss in a foundry than any other single unit of the foundry organization.

With the exception of the foundry, the trend, for the past ten years in manufacturing industries, has been toward the most complete development of their inspection departments. I assume that foundrymen have looked upon this department as an unnecessary expense rather than as an aid in operating their plants more efficiently and successfully. Without a knowledge of what is demanded of the machine shop product, the foundry heads have always maintained that their output was not being treated fairly by the machinists. Because the foundry for so long a period has been making castings without a standard of quality the machine shop, whose product depends mainly upon the foundry, has been compelled to establish its own standard for accepting or rejecting castings, and with regard only for its own protection it has placed such rigid specifications on castings that it has entailed a great hardship on the foundry.

This has been true of the automobile industry to a greater extent probably than any other line of work with which the foundry has ever been connected. The development of this industry has been so rapid and on so broad a scale that it has been difficult for the foundry to meet the constantly changing demands of the automobile engineers. Consequently foundries have been compelled to sustain many losses unjustly, and, being without protection of competent inspection departments, there has been no redress, since the technical requirements of the engineers were beyond their comprehension and understanding. Many of these losses, however, could have been placed where they rightfully belonged provided the foundry had had a corps of properly trained inspectors.

SELECTING AN INSPECTOR

When the writer first began to manufacture automobile castings he found it an extremely difficult problem to know when castings were right or wrong, but in an honest endeavor to establish a standard of quality and to develop an inspection department that would maintain this standard in his own factory, he first employed an expert foundryman. This experiment, however, soon proved an utter failure, since the inspector was partial to the foundry in all his reports and by nature antagonistic to the machine shop. The foundryman was replaced by a patternmaker in the belief that his knowledge of patternmaking, his ability to read blue prints and his knowledge of foundry methods would eminently fit him for the position which the writer was endeavoring to establish. The patternmaker also proved a failure, since, in addition to having the same faults as the expert molder, he constantly tried to protect the pattern department's product in use in the foundry.

Before making the third attempt the inspection department was removed from the direct supervision of the foundry and a thoroughly practical machinist was placed in charge. In filling the position an effort was made to get a man who was broad enough to fully protect the machine shop and at the same time make due allowances for the slight variations which occur in foundry practice. His progress at first was slow, as he was greatly handicapped by the antagonistic attitude of the foundry organization, since the molders objected strenuously to accepting the views of a machinist. It was doubly difficult for him when it became necessary to make corrections in the methods of molding. However, with the knowledge he had of the manner in which the castings were to be machined and of the parts that had to be absolutely accurate, his suggestions regarding changed and improved foundry methods soon became invaluable to the molder in reducing his scrap.

The machinist, having had a more thorough training in gas engine practice than the foundryman, could prevent the molders from making changes in either gas or water passages, altering port cores or, in fact, in making changes in any part of the casting which would be contrary to good engine practice. Also, having had experience in the use of jigs and tools in the machine shop, it was simple for him to apply this knowledge to coremaking and molding and to insure uniform castings, wooden gages were soon replaced with steel and iron fixtures.

The non-interchangeability of cores and core assemblies was a source of perplexity to the man trained in machine shop practice, and in endeavoring to locate the cause of this lack of uniformity so as to eliminate fitting and filing in the foundry, it was soon determined that patterns and core boxes would have to be repaired to insure the perfect fitting of loose pieces and removable parts. Even after the equipment was put in proper condition it was almost impossible to convince the molder that it was unnecessary to file cores as formerly, since the force of habit and past practice governs the molding industry to such an extent that it is often difficult to introduce new ideas.

INSPECTION SHOULD BE POSITIVE AND ACCURATE

The means of inspection employed should be positive and accurate. If the casting is intricate or complicated or has a number of machined surfaces standard gages can readily be made and the casting placed in the same relative position in which it is to be held while being machined, and the finished surfaces and cored openings can be checked quickly and accurately.

Some time ago I was making a four-barrel, *en-bloc* cylinder casting, with the crank case integral, on which it was necessary to check 20 or 25 points before it was shipped. A fixture was designed in which the casting was placed and every point to be checked was inspected at one handling. A duplicate fixture was later made by the customer and his inspection department used exactly the same method as I did when passing on the castings. In a great many cases a check of this kind may show an error in the casting which could be laid out and favored slightly without any additional expense in the machining operation, whereas if this is not taken care of in the foundry the machine shop will handle the casting in the regular way and reject it as an imperfect casting.

HYDRAULIC TEST OF CYLINDERS

Automobile cylinder castings must be tested hydraulically before shipment from the foundry to determine porosity which may exist in the water jackets. This is done most economically and successfully where a constant pressure is maintained on the casting for a time long enough to give the water an opportunity to sweat through any pores which may exist in the casting. This cannot be detected as positively by the use of a hand pump, where the pressure is raised gradually and maintained for a short interval. It also is a decided advantage to the foundry to maintain a high pressure

*From a paper presented at the September meeting of the American Foundrymen's Association at Atlantic City.

†Wilson Machine & Foundry Company, Pontiac, Mich.

on the water jackets, thus forcing the water into the pores of the casting, which will rust any porosity which may exist. A great many times castings are returned to the foundry because the jackets leak. However, when again tested at the foundry the trouble is not apparent, as the leak had been closed by rusting, and this results in an argument which in a majority of cases could have been avoided if the casting had been properly tested before shipment.

To maintain a uniform foundry product is difficult owing to the fact that the human element enters into the production. I have had jobs that have not given any trouble for months, when suddenly a greatly increased scrap loss would occur without apparent reason. Without an inspection department this trouble would probably not be discovered until the customer began to machine the castings, and probably by that time many thousands of imperfect castings would have been made, shipped or in process of manufacture.

LARGE STOCKS OF ROUGH CASTINGS

To-day, when single automobile companies are producing from 100 to 1000 automobiles per day, it is absolutely necessary for them to carry a large supply of rough castings in stock. This becomes an extreme hazard to the foundry unless every casting has passed through a competent inspection department. In fact, I know of automobile manufacturers who keep two and three sets of cylinder patterns in stock to guard against any emergency which may arise. This is necessary unless a foundry has an inspection department to locate these troubles before castings are shipped and is able to remedy them before serious loss is incurred as a result of the customer carrying a stock of several thousand defective castings.

Only too frequently the machine shop returns castings to the foundry which have been spoiled through its own neglect, and unless protected with a competent inspection department, the foundry eventually absorbs nearly all the machine shop loss. But when such rejected castings are again inspected by the foundry and the machine shop is compelled to tag each casting with the reason for its return, rejected castings are reduced 75 per cent.

The work of the inspection department does not end with checking the mechanical troubles of the foundry and core room, but it is necessary that its reports cover the machinability of the iron. The inspection department should be provided with a lathe and drill press to turn and drill castings to determine whether the iron is satisfactory. It is true that the chemist has his analysis and test bars, but he must be checked in this, as a great many things can happen between the charging door and the shipping room which will upset all his calculations. Then, too, it is always a good plan for the inspection department to take a cut off certain castings to determine whether there are any draws, shrinks or porosity which should have the attention of the metallurgist or the foundry organization.

STOPPING LOSSES PROMPTLY

Foremen and superintendents in their executive capacity can recommend methods for reducing scrap when such losses are directed to their attention, but without an inspection department these losses may occur for a considerable time before they become cognizant of them, and even then if the loss is not stopped at once another period of loss is experienced until it again has the executive's attention. An inspection department detects loss, and after a careful analysis determines the cause and sees to it that the loss is stopped at once or that some good reason is given.

Most foundries maintain a salvage department which should be under the supervision of the inspection department. Any castings sent to the salvage department should be reported as scrap to the foundry. If this is not done no effort may be made to eliminate the troubles.

The rapidity with which the inspection department is able to make reports of defects, with their causes, to the foundry organization is a factor of the utmost importance. I have found it good practice to run the cleaning room during the night and have the first rough inspection report ready early the next morning to enable the foundry to check errors in core setting and bad molding which had caused defective castings on the previous day. Many times the superintendent and foreman are unable to give a reason, but when the inspector goes to the workroom he finds that he has been ordered to do the work in a certain way, and the molder will not criticise the judgment of his superiors unless shown that his individual record is being damaged by an excessive scrap loss. When this personal interest is instilled in the molder and coremaker it is comparatively easy to get them to co-operate in reporting when cores are wrong or core boxes and patterns are out of shape. In this way they really inspect their own equipment and work and thereby contribute to the reduction of scrap. It is this latter objective toward which the inspection department should constantly work, not alone to increase its own efficiency and skill in checking and inspecting castings, but to instill in the molder and coremaker the necessity for accurate and careful workmanship and the spirit of co-operation and willingness to receive instruction relative to ways and means of reducing their scrap. Half the battle for the reduction of scrap is thus won.

REPORTS AS A PERMANENT RECORD

I have always found it good practice to make a permanent record of all the reports from the inspection department, compelling it to record the reason for scrapping each casting, sending one copy daily and as early as possible to the foundry and filing one copy for future reference. A recapitulation and an analysis of these reports every week or ten days, giving the average loss during that period, give a more comprehensive knowledge of the operation of the foundry than that gained from the analysis of a single day's report. Also, a record of this kind is helpful in starting new orders for work which previously had been made in the foundry, since the elimination of the liability of repeating bad practices will insure a decreased scrap loss.

COST OF AN INSPECTION DEPARTMENT

The cost of maintaining an inspection department is quite an item unless results accruing from its operation reduce costs, either in manufacturing or in the reduction of the number of castings returned. The success or failure of a foundry is found in its scrap pile, and if the inspection department is a factor in reducing the scrap of a plant it has paid its own cost many times. For example, if the direct and indirect costs of a foundry are $400 per day and the average scrap loss is 20 per cent, the cost of good castings is increased $100. An inspection department of five men would easily take care of a foundry of this size at a cost of about $15 per day. If by this means the scrap loss is cut to 10 per cent there is at once a saving of $55 less $15, the cost of inspection, which would net $40. At the same time, the foundry is able to increase its production without the addition of equipment such as molding machines, flasks, etc., and is then working on an efficient basis, reducing costs, cutting out superfluous indirect expenses and increasing the output.

SOME OF THE ADVANTAGES

The foundry that endeavors to inspect its own castings and prevents its organization from trying to impose defective material upon its customers, with the hope that they may overlook it or in some way be forced to use it, will eliminate nearly all competition. When a machine shop forms a connection with a foundry which gives service and quality, keeping all casting troubles in the foundry, it is a difficult problem for a competing foundry to get an opportunity to quote prices.

Also, the shop with a reputation for quality will get from 10 to 15 per cent more for its product than the foundry not so protected. It also instills in the customer a feeling that he is being treated fairly and makes him less critical, while the rejections are less subject to the erratic temper of his machine shop foreman. Also, the machine shop organization will be more in-

clined to work with the foundry management when castings show some slight defects, especially when they are notified in advance that certain castings are not up to standard, but that corrections have been made and that with a slight adjustment in their fixtures they will be able to use them. With this feeling of fair play and co-operation between machine shop and foundry rejections can be reduced to the minimum.

It always has been my contention that the inspection department, once properly organized in a foundry, is of the utmost importance and will determine to a large extent the failure or success of the entire business. The proper use of reports and information gleaned from the inspection department will reduce the scrap in the foundry, which in turn reduces overhead expense, increases output, standardizes quality, makes satisfied customers, eliminates competition and insures the permanent success of the business.

PERSONAL

James E. Ferguson, president Ferguson Steel & Iron Company, Buffalo, was given a loving cup by the employees of the company at a banquet at the Hotel Lafayette Saturday evening, Dec. 18. The presentation speech was by Charles W. Hyne, general manager, and remarks were made by a number of guests of the company.

One of the new Lake ore steamers is to be named the J. Leonard Replogle. Mr. Replogle was given a dinner in Johnstown, Pa., on the evening of Dec. 20.

Joseph G. Butler, Jr., Youngstown, Ohio, probably the best known and most popular man in the iron trade of the country, has been receiving congratulations this week on his seventy-fifth birthday anniversary.

George Otis Smith, director of the U. S. Geological Survey, in his annual report just submitted refers as follows to the changes in the Division of Mineral Resources due to the resignation of Edward W. Parker: "Hiram D. McCaskey was appointed geologist in charge; E. F. Burchard, geologist in charge of the section of non-metallic resources, and C. E. Lesher, associate geologist to take charge of the statistics of coal. The number of men designated to take up the work relinquished by Mr. Parker is perhaps the strongest indication of the amount and importance of that work which he so long successfully carried on."

J. R. McWane, Birmingham, Ala., president of the American Cast Iron Pipe Company, sails Dec. 25 for a three months' tour of South America. He will go first to Valparaiso, Chile, and later will make a considerable stay in Buenos Aires and Rio de Janeiro.

B. J. Padshah of the firm of Tata Sons & Co., London, managing director of the Tata Iron & Steel Company, Sakchi, India, will arrive in New York this week on the Rotterdam.

B. H. M. Hanson, vice-president and general manager of the Pratt & Whitney Company, Hartford, Conn., has been confined to his house by illness for some time and is not expected to resume his duties until the middle of January.

T. H. Hermanson, formerly connected with the Epping-Carpenter Pump Company, Pittsburgh, has resigned to accept the position of superintendent with the Blake & Knowles Steam Pump Works, Cambridge, Mass.

J. P. Barrow, who has been in charge of the publicity department of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has taken up duties in the operating department of that company. He is succeeded in the publicity work by R. J. Kaylor.

J. W. Sheperdson has resigned as assistant general superintendent of the Central Iron & Steel Company, Harrisburg, Pa., to go in the early part of January with the Morgan Construction Company, Worcester, Mass.

B. W. Burtsell, who has been assistant factory manager of the Packard Motor Car Company, Detroit, Mich., formerly with the Brown & Sharpe Mfg. Company, Providence, R. I., has been appointed sales manager of the Whitney Mfg. Company, Hartford, Conn.

W. C. McGraw, formerly connected with the Philadelphia office of the Republic Iron & Steel Company, has been transferred to the Detroit office in the sales department.

The Timken-Detroit Axle Company, Detroit, Mich., announces the acquisition of Joseph C. Regan, formerly assistant general superintendent of the Yale & Towne Mfg. Company, Stamford, Conn., who will be general factory manager; Charles S. Dahlquist, for the last four years chief engineer of the Lippard-Stewart Motor Car Company, Buffalo, N. Y., who will be shop superintendent of the Timken-David Brown Company and will specialize on worm drive for motor trucks, and W. F. Taylor, a graduate engineer from Perdue University, lately associated with the Ross Gear Company, Lafayette, Ind., who will represent the Timken-David Brown Company in a selling and engineering service capacity. The promotion of W. L. Gleason from assistant factory manager to assistant to the vice-president in charge of manufacturing is also announced. During the thirteen years he was with the Yale & Towne Company Mr. Regan, through his good work and careful supervision of all of their various plants, helped in a great measure to make a reputation for this concern of having one of the most efficient factories in this country.

At a meeting of the directors of the Harlan & Hollingsworth Corporation, Wilmington, Del., S. K. Smith was elected vice-president to succeed Persifor Frazer. He is now both vice-president and treasurer. Henderson Weir, secretary of the corporation, was elected a director.

Elmer E. Neal, formerly superintendent of the Smith & Wesson Company, Springfield, Mass., has been selected as works manager of the Marlin Arms Company, New Haven, Conn. John Owsley has been appointed assistant general manager; he has been associated with Vice-President Buckland of the New York, New Haven & Hartford Railroad and was formerly general manager of the Eastern Steamship Company.

The list of officers of the National Association of Brass Manufacturers, as printed in the issue of THE IRON AGE of Dec. 16, was in error in giving the name of Edward F. Hoffman, Hoffman & Billings Mfg. Company, Milwaukee, Wis., as first vice-president and second trustee. It should have read Edward F. Niedecken of the same company.

The Morse Chain Company, manufacturer exclusively of silent chains for power transmission, Ithaca, N. Y., announces that its interests for the territory including North and South Carolina will hereafter be taken care of by G. W. Pritchett, with headquarters at 805 Ashboro Street, Greensboro, N. C., an engineer and an experienced machinery salesman.

William H. Carpenter, superintendent Bristol Brass Company, Bristol, Conn., has resigned after 33 years' service. He has been succeeded by John F. Wade, formerly superintendent of the New Departure Mfg. Company.

John W. Bryce, who has had charge of the ball bearing department of the New Departure Mfg. Company, Bristol, Conn., for a number of years, has resigned to become superintendent of the Abbott Ball Bearing Company, Elmwood, Conn.

William Smith has been appointed superintendent of the Southington Hardware Company, Southington, Conn.

Elliott H. Whitlock, formerly works manager of the National Carbon Company, will on Jan. 1 become superintendent of manufacturing of the Sandusky Portland Cement Company, Sandusky, Ohio.

OBITUARY

ABRAHAM O. TINSTMAN, in early life associated with H. C. Frick in the coke business in the Connellsville region, died at his home in Turtle Creek, Pa., Dec. 14, aged 81 years. He was born in Westmoreland County, Pa. In 1865 Mr. Tinstman and Joseph Rist of Pittsburgh purchased 600 acres of coal lands in the Connellsville coke regions, and a short time later they and A. S. M. Morgan, also of Pittsburgh, organized the firm of Morgan & Co., which erected 111 ovens at Morgan Mills, Fayette County. These ovens were the first built in Pennsylvania. In 1871 H. C. Frick was employed as a bookkeeper by Mr. Tinstman's grandfather, A. Overholt, at Broad Ford, and his ability caused Mr. Tinstman and his partners to take him into their business, from which grew the Frick Coke Company. During the panic in 1873 Mr. Tinstman met with financial difficulties, but soon after obtained an option on 3500 acres of coal land in the Connellsville district, which he sold at a large profit. He then organized the Connellsville Coal & Iron Company. In 1880 he established the A. O. Tinstman Company, Pittsburgh, coke manufacturer, and subsequently purchased the Mount Braddock Coke Company and the Pennsville Coke Company. A few years later he sold all his manufacturing interests and engaged in buying and selling coal land until recently, when he retired. He leaves his widow and one son.

MICHAEL J. QUIRK, one of the few who were connected with the New York City iron and steel trade fifty years ago, died Dec. 14 at his home in Flushing, Long Island. He served continuously for over half a century Thomas Firth & Sons, Ltd., of Sheffield, England, through their American agents. He started as a boy under Jere Abbott when the Sheffield firm opened its own first warehouse at 81 John Street, moving thence to 23 Cliff Street, its present location. He was in charge of the stock in all the changes in agents down to Wheelock, Lovejoy & Co., under whom he served until he retired from active business a few weeks before he died. He had a wide acquaintance with the buyers of Swedish iron and had the reputation of knowing offhand the different brands better than any other man in the business. He took much interest in public affairs, serving three times as trustee of the old village of Flushing. It was during his incumbency and largely through his efforts that modern municipal improvements were installed. He leaves his widow and one son, Oscar F. Quirk, who is engaged in the machine business.

L. M. BRIGHAM, sales manager of the brass goods department of Manning, Maxwell & Moore, Inc., New York, died Dec. 11 at his home in East Orange, N. J., after a long illness, which did not, however, incapacitate him from business until recently. He was 42 years old and had been with Manning, Maxwell & Moore for twenty-two years, and for the last five years was a director of the company. He was secretary of the Ashcroft Mfg. Company, United Injector Company and Consolidated Safety Valve Company, all subsidiaries of the corporation. Mr. Brigham possessed great ambition and energy, qualities with which were combined affable traits that constantly added to his circle of friends. He was a member of the Engineers' Club of New York. He leaves his widow and one child.

ALBERT C. F. WICHMAN, for many years manager of the Anthony Wayne Mfg. Company and more recently head of the Western Oil Pump & Tank Company, St. Louis, Mo., died Dec. 14, after a short illness, aged 80 years. He was a native of Brandenburg, Prussia, and came with his parents to the United States in 1849.

THOMAS L. WILLSON, of Ottawa, Canada, died in New York City Dec. 21. He is credited with the discovery in 1892 of acetylene gas for commercial purposes and with the invention of the acetylene gas buoy.

GEORGE E. SOMERS, vice-president Bridgeport Brass Company and president Bridgeport Crucible Company, Bridgeport, Conn., died Dec. 18, aged 82 years. He was born in Newtown, Conn., and began his business career in Waterbury. Thirty-five years ago he removed to Bridgeport and purchased an interest in the Bridgeport Brass Company, becoming its general manager, a position he held for many years. He was active in organizing the Bridgeport Crucible Company and was its president up to the time of his death. He was prominent in the political affairs as well as in the business circles of his home city.

HOWARD PRICE ARMSTRONG, superintendent Harris Marine Engine Company, Wilmington, Del., was drowned in the Delaware Bay Dec. 11. He was in a launch which caught fire. He was 34 years old.

ROBERT S. FLEMING, vice-president Landis Machine Company, St. Louis, Mo., maker of shoe machinery principally, died Dec. 13, aged 76 years.

FRANK K. BAILIE, assistant sales manager H. K. Porter Company, Pittsburgh, died at his home in that city Dec. 14 from pneumonia after an illness of only a few days.

GEORGE F. SINCLAIR, secretary and treasurer of the Grand Rapids Brass Company, Grand Rapids, Mich., since its organization in 1888, died Dec. 7.

Manganese Ore in Virginia

The renewed interest in the manganese deposits of Virginia, due to the war, has not been as productive of results as was expected a year ago. There has been a great deal of negotiating and some attempts at financing, and engineers, ore buyers and investors have been investigating the best known manganese-bearing areas. The Roanoke, Va., correspondent of the *Engineering and Mining Journal* has the following:

> The Crimora mines properties at Elkton, one in Rye valley and several others have received serious attention and with good results as far as development has progressed. The Piedmont Manganese Company's mine, near Lynchburg, has been reopened and promises soon to resume shipments. At Crimora the consummation of the very extensive equipment and financial program has delayed actual output. At Elkton litigation as to title has kept back recent negotiations. In Rye valley, financial mishaps in Philadelphia postponed the completion of what promised to be a successful operation to mine manganese and manganiferous iron ore. Numerous smaller operations have realized small shipments. On the whole, outside capital has not yet come to take the Virginia deposits very seriously, and local capital is not available ordinarily for even the prospecting of the many promising deposits in the Piedmont, James-Staunton River, and the southwest Virginia districts.

Record Shipments of Sulphuric Acid

The fear that a scarcity of sulphuric acid in Great Britain may cause the closing of some rolling mills there and the fact that large quantities are used in the American steel industry lends interest to the following table of exports of this acid, which are at the greatest rate in the history of the country:

	1913, Pounds	1914, Pounds	1915, Pounds
Nine months ended Sept. 30	5,664,544	7,057,802	63,436,045
Year ended June 30.....	9,790,532	12,131,750	46,771,510

The average monthly exports this year to Oct. 1, were 7,048,449 lb. or nearly equal to the total for the nine months of 1914. For the fiscal year ended June 30, 1915, the average exports were at the rate of 3,897,626 lb. per month. Sulphuric acid, 66 deg. Baumé, which sold for less than $20 per ton before the war, is now bringing as high as $80 per ton.

Platinum deposits recently discovered in Spain and said to be among the richest in the world, have been turned over to the government by the discoverer, according to Consul Robertson Honey of Madrid. Chromium and nickel are also present. Concessions to exploit these mines are to be granted to foreigners as well as Spaniards.

The Iron and Metal Markets

EXPORT EMBARGO HELPS

Home Consumers of Steel Will Get More

Finished Material Prices Highest in Many Years—Another Wire Advance

The embargo laid by all railroads on shipments of iron and steel products to New York for export, while it throws some serious problems on the mills, is a blessing to domestic consumers. While exports of steel have been declining since August, largely because of transportation difficulties, they have amounted to enough to bring measurable relief if diverted into home channels.

Steel companies having contracts with foreign governments where the latter were to take care of ocean transport, have had in recent weeks only a fraction of the number of vessels promised. The return to trade channels of vessels taken in the fall for the carrying of troops and supplies is problematical.

While billets, blooms, bars and wire products have figured prominently in exports, the easing up at home due to the embargo will extend to other forms of finished material, as in the release of steel for plate departments, for example, the soaring of plate-mill prices finding a parallel in no other line. Yet the situation in respect to a number of finished products is so tense that too much should not be expected from the holding up of exports.

There is more pressure from consumers to get places on the steel companies' order books for deliveries after July 1, 1916, and the amount of such business taken is increasing, though some mills still insist they are not ready to sell for the second half. The calculations of important manufacturers who work up iron and steel are more and more based on the projection of record consumption and high prices far into next year.

The effect of high prices in discouraging new construction and otherwise limiting consumption is recognized throughout the trade, but only in a theoretical way, as long as producers feel that curtailment from some cause is desirable.

Prices on contract bars, shapes and plates, now generally 1.80c., Pittsburgh, are at the highest level since the formation of the Steel Corporation. On plates all the way from $4 to $14 above this price is paid for shipments within three or four weeks. Few mills, in fact, will sell below 2.25c., Pittsburgh, for early delivery and at Cleveland 2.50c. has been reached.

Chicago, somewhat in contrast with Pittsburgh, has had rather heavy new inquiry in the past week, with some reservations for the second half, and the formal opening of books for that delivery may not be long delayed by Western mills. Out of 14,000 tons placed at Chicago in fabricated steel contracts, 7000 tons was for Illinois Steel Company extensions. Inquiry in that district for reinforcing bars is large, including 8300 tons for a warehouse job on the Pacific coast.

Wire products were advanced $2 a ton Dec. 20, bringing nails to $2.10, Pittsburgh, and plain wire to $1.95—the highest prices in many years. In the boom of 1906-7 the highest contract price for wire nails was $2.05. That jobbers have light stocks is indicated by the fact that few are now getting nail shipments at less than $1.90, which was the market so lately as Nov. 15.

Warehouse business has been growing. One Western jobber's orders amounted to 15,000 tons in a recent day. Nothing could indicate better urgency of some manufacturing consumers' needs.

Rail orders are coming forward in moderate volume. The Great Northern's recent contract was for 25,000 tons, distributed to five mills. The Clover Leaf has bought 6000 tons and the Chicago & Eastern Illinois 10,000 tons, while the Southern Railway is in the market for an additional 18,000 tons.

Pig-iron buying has shown some let-up in the East and Central West, but at Chicago inquiry is heavy and a large Milwaukee foundry has taken a round block. More important foundry interests are providing in part for their needs in the second half of next year, but producers are holding back as to that period. Some Southern furnaces have quoted $16 at Birmingham for No. 2 iron for second half.

A number of blast furnaces are getting on narrow margins in their coke supply because of the freight embargoes, and here and there a stack has banked awaiting coke. The market for prompt coke has advanced sharply and as high as $3.50 has been paid for considerable lots.

Great Britain has forbidden the export of hematite pig iron and of scrap iron and steel and is providing against runaway prices by fixing a sliding scale for No. 3 Cleveland and hematite irons.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month and one year previous

	Dec. 22, 1915.	Dec. 15, 1915.	Nov. 24, 1915.	Dec. 23, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	$19.50	$19.50	$17.75	$14.25
No. 2, Valley furnace....	**18.50**	18.00	16.00	12.75
No. 2 Southern, Cin'ti..	**17.40**	16.90	16.40	12.40
No. 2, Birmingham, Ala.	**14.50**	14.00	13.50	9.50
No. 2, furnace, Chicago*	18.00	18.00	17.50	12.75
Basic, del'd, eastern Pa.	**18.50**	18.00	17.50	13.50
Basic, Valley furnace....	**18.00**	17.50	16.00	12.50
Bessemer, Pittsburgh ...	**19.95**	19.45	17.95	14.70
Malleable Bess., Ch'go*.	**18.50**	18.00	17.50	12.75
Gray forge, Pittsburgh..	**18.10**	17.95	16.45	13.40
L. S. charcoal, Chicago..	19.25	19.25	17.25	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	**32.00**	30.00	28.00	19.00
O.-h. billets, Pittsburgh..	**33.00**	31.00	29.00	19.00
O.-h. sheet bars, P'gh....	**35.00**	31.00	29.00	20.00
Forging billets, base, P'gh	52.00	52.00	50.00	24.00
O.-h. billets, Phila.....	**40.00**	36.00	35.00	21.40
Wire rods, Pittsburgh...	40.00	40.00	38.00	25.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	**2.059**	1.959	1.859	1.17½
Iron bars, Pittsburgh....	1.80	1.80	1.65	1.15
Iron bars, Chicago.....	1.75	1.75	1.60	0.95
Steel bars, Pittsburgh....	**2.00**	1.80	1.70	1.05
Steel bars, New York...	**2.169**	1.969	1.869	1.21
Tank plates, Pittsburgh..	**2.25**	1.90	1.90	1.05
Tank plates, New York..	**2.419**	2.169	2.169	1.21
Beams, etc., Pittsburgh..	**1.90**	1.70	1.70	1.05
Beams, etc., New York..	**2.069**	1.869	1.869	1.21
Skelp, grooved steel, P'gh	1.70	1.70	1.70	1.10
Skelp, sheared steel, P'gh	1.80	1.80	1.80	1.15
Steel hoops, Pittsburgh..	**2.00**	1.90	1.75	1.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Dec. 22, 1915.	Dec. 15, 1915.	Nov. 24, 1915.	Dec. 23, 1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.50	2.50	2.40	1.80
Galv. sheets, No. 28, P'gh	4.75	4.75	4.25	2.75
Wire nails, Pittsburgh	**2.10**	2.00	1.90	1.50
Cut nails, Pittsburgh	1.90	1.90	1.85	1.55
Fence wire, base, P'gh	**1.95**	1.85	1.75	1.30
Barb wire, galv., P'gh	**2.95**	2.85	2.75	1.90
Old Material, Per Gross Ton:				
Iron rails, Chicago	16.00	16.00	16.00	11.00
Iron rails, Philadelphia	**19.50**	19.00	17.50	13.00
Carwheels, Chicago	14.50	14.50	14.50	9.75
Carwheels, Philadelphia	**16.00**	15.50	14.00	10.25
Heavy steel scrap, P'gh	17.50	17.50	17.00	11.00
Heavy steel scrap, Phila.	**16.00**	15.75	14.75	9.50
Heavy steel scrap, Ch'go	15.75	15.75	15.00	8.50
No. 1 cast, Pittsburgh	15.25	15.25	14.00	11.25
No. 1 cast, Philadelphia	**16.75**	15.75	14.50	11.50
No. 1 cast, Ch'go (net ton)	13.75	13.75	13.00	9.25
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	**$3.25**	$2.75	$2.10	$1.50
Furnace coke, future	2.40	2.40	2.35	1.75
Foundry coke, prompt	**3.25**	2.75	2.75	1.90
Foundry coke, future	3.00	3.00	3.00	2.15
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**20.25**	19.75	19.87½	13.50
Electrolytic copper, N. Y.	**20.25**	19.50	19.87½	13.25
Spelter, St. Louis	**17.25**	16.50	18.75	5.50
Spelter, New York	**17.50**	16.75	19.00	5.65
Lead, St. Louis	**5.30**	5.25	5.17½	3.65
Lead, New York	5.40	5.40	5.25	3.80
Tin, New York	**39.50**	37.65	39.25	33.30
Antimony, Asiatic, N. Y.	39.00	39.00	39.50	13.00
Tin plate, 100-lb. box, P'gh.	$3.50	$3.50	$3.40	$3.10

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.90c. to 2.25c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft. are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 lb. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers. Fence wire, Nos. 0 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, $1.95; galvanized, $2.65. Galvanized barb wire and staples, $2.95; painted, $2.25. Wire nails, $2.10. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Woven wire fencing, 67½ per cent off list for carloads, 66½ off for 1000-rod lots, 65½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.00	$2.05	$2.10	$2.15	$2.30	$2.40	$2.50	$2.60
Galvanized	2.90	2.95	3.00	3.05	3.10	3.25	3.60	3.70

Wire Rods.—Bessemer, open-hearth and chain rods, $40.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 1.80c. to 2c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, on steel and iron galvanized pipe, and from Nov. 1, 1915, on steel and iron black pipe, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	71	46½	⅛ and ¼	63	37
½	75	59½	⅜	63	37
¾ to 3	78	63½	½	67	47
			¾ to 2½	70	52
Lap Weld					
2	75	60½	1⅛	54	36
2½ to 6	77	62½	1½	65	47
7 to 12	75	58½	2	66	49
13 and 14	61½	..	2½ to 4	68	52
15	59	..	4½ to 6	68	52
			7 to 12	66	50
Reamed and Drifted					
1 to 3, butt	76	61½	1 to 1½, butt	68	50
2, lap	73	58½	2, butt	68	50
2½ to 6, lap	75	60½	1¼, lap	52	34
			1½, lap	63	45
			2, lap	64	47
			2½ to 4, lap	66	50
Butt Weld, extra strong, plain ends					
⅛, ¼ and ⅜	66	49½	⅜	60	42
½	71	58½	½	65	51
¾ to 1½	75	62½	¾ to 1½	69	53
2 to 3	76	63½	2 and 2½	70	54
Lap Weld, extra strong, plain ends					
2	72	57½	1½	64	48
2½ to 4	74	59½	2	66	49
4½ to 6	73	58½	2½ to 4	68	52
7 to 8	67	50½	4½ to 6	67	51
9 to 12	62	45½	7 to 8	60	44
			9 to 12	55	39
Butt Weld, double extra strong, plain ends					
½	61	48½	½	55	40
¾ to 1½	64	51½	¾ to 1½	58	43
2 to 2½	66	53½	2 and 2½	60	45
Lap Weld, double extra strong, plain ends					
2	62	49½	2	56	40
2½ to 4	64	51½	2½ to 4	58	45
4½ to 6	63	50½	4½ to 6	57	44
7 to 8	57	40½	7 to 8	50	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap welded steel tubes and standard charcoal iron tubes, effective from Dec. 1, 1915, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	47	1½ in.	42 to 43
1¾ and 2 in.	59	1¾ and 2 in.	46 to 47
2¼ in.	56	2¼ in.	43 to 44
2½ and 2¾ in.	62	2½ and 2¾ in.	50 to 51
3 and 3¼ in.	67	3 and 3¼ in.	54 to 55
3½ to 4½ in.	68	3½ to 4½ in.	56 to 57
5 and 6 in.	61	5 and 6 in.	50 to 51
7 to 13 in.	58		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.20
Nos. 9 to 10	2.25
Nos. 11 and 12	2.30
Nos. 13 and 14	2.35
Nos. 15 and 16	2.45

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	2.15 to 2.25
No. 12	2.15 to 2.25
Nos. 13 and 14	2.20 to 2.30
Nos. 15 and 16	2.25 to 2.35
Nos. 17 to 21	2.30 to 2.40
Nos. 22 and 24	2.35 to 2.45
Nos. 25 and 26	2.40 to 2.50
No. 27	2.45 to 2.55
No. 28	2.50 to 2.60
No. 29	2.55 to 2.65
No. 30	2.65 to 2.75

Galvanized Sheets of Black Sheet Gage

	Cents per lb.
Nos. 10 and 11	3.75
No. 12	3.85
Nos. 13 and 14	3.85
Nos. 15 and 16	3.95
Nos. 17 to 21	4.10
Nos. 22 and 24	4.30
Nos. 25 and 26	4.45
No. 27	4.60
No. 28	4.75
No. 29	4.90

Chicago

CHICAGO, ILL., Dec. 22, 1915.—(*By Wire.*)

The wide distribution of inquiries made necessary under existing conditions, in order that every possible source of raw material may be revealed, doubtless magnifies the volume of the business of which it is the forerunner. Nevertheless, a single interest was asked last week to quote on more than 100,000 tons of various products of which it could consider scarcely a quarter. Much of this inquiry is for material on which the operation of manufacturing plants depends. It is therefore not surprising that reservations of tonnage are being made even though it is with the understanding that no material can be shipped before July 1 and that some of the mills are on the eve of opening their books for the second half. Already the outlook is for heavy bookings in that period. Rail buying of last week exceeded 55,000 tons, with approximately 20,000 tons still unplaced. Structural business also ran into larger figures, reported contracts for fabricated material calling for 14,000 tons. Inquiry for plates is active, and buying at premium prices is surprisingly heavy. Much business is going to the warehouses, one Chicago jobber taking a total of 15,000 tons in a single day. At the prevailing level of mill prices which, though nominally on the basis of 1.80c., Pittsburgh, range upward from 2c. on all material for normal delivery, this dependence upon steel from stock will be rapidly augmented. Inquiry for pig iron has again expanded, the requirements of the largest Milwaukee machinery manufacturer being especially prominent. Southern prices are higher and still rising.

Pig Iron.—The furnaces apparently have been able to present with considerable force the prospect for higher prices, if the exceptionally prompt closing of a large inquiry last week may be taken as an evidence of that fact. This inquiry, which was from the large machinery manufacturer at West Allis, Wis., appeared early in the week and was closed within a few days, the amount involved being approximately 6000 tons. Inquiries for malleable iron from three consumers were also closed, resulting in purchases of an aggregate of about 10,000 tons. A number of additional sales up to 2000 tons are reported. At least two lots of 1000 tons for second half delivery have been taken by a local furnace. Among the sales of the week were a number of lots of Southern iron, part placed at $14.50 and part at $15, Birmingham, and it is now doubtful if lower than $15 can be done. For local iron, $18 at furnace for No. 2 foundry and $18.50 for malleable are the ruling figures. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.25 to $19.75
Lake Superior charcoal, No. 1	19.75 to 20.75
Lake Superior charcoal, No. 6 and Scotch	20.25 to 21.25
Northern coke foundry, No. 1	18.50 to 18.75
Northern coke foundry, No. 2	18.00 to 18.25
Northern coke foundry, No. 3	17.50 to 17.75
Southern coke, No. 1 f'dry and 1 soft	19.00
Southern coke, No. 2 f'dry and 2 soft	18.50
Malleable Bessemer	18.50
Standard Bessemer	18.50
Basic	18.00
Low phosphorus	32.50 to 36.00
Silvery, 8 per cent	26.50
Silvery, 10 per cent	27.50

(*By Mail*)

Rails and Track Supplies.—Recent rail purchases involve an aggregate of considerable importance. The Great Northern Railway has completed purchases of 25,000 tons, of which 15,000 tons is to be rolled at Chicago, the remainder being distributed among several Eastern mills and the Colorado mill. The Clover Leaf has bought 6000 tons and the Chicago & Eastern Illinois 10,000 tons. Other smaller purchases, totaling about 15,000 tons, are also reported, while the Southern Railway is in the market for approximately 18,000 tons. We quote standard railroad spikes at 2.10c., base; track bolts with square nuts, 2.50c., base, all in carload lots, Chicago; tie plates, $36, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.43c.; 16 to 20 lb., 1.48c.; 12 lb., 1.53c.; 8 lb., 1.58c.; angle bars, 1.50c., Chicago.

Structural Material.—Western fabricators report that they are figuring on a fair tonnage of new business. This is borne out by the contracts placed last week which carried an aggregate of 14,000 tons. Half of this is for plant extensions at the South works of the Illinois Steel Company, the work to be done by the American Bridge Company. The Kansas City Structural Steel Company took 2500 tons for a Calumet & Arizona smelter, while 1050 tons for bridges for the Sanitary District of Chicago was divided, 670 tons to the Milwaukee Bridge Company and 380 tons to the Chicago Bridge & Iron Company. Other contracts include 1000 tons for the University of California, taken by the Pacific Rolling Mill Company; 900 tons for Armour & Co., by the Hansell-Elcock Foundry Company; 350 tons for the Corn Products Refining Company, by the South Halsted Street Iron Works; 350 tons for the city of Chicago, for an incinerator, by North Works and 750 tons placed by the Great Western Sugar Company for a factory building. For new cars, the only inquiry of importance is that of the Missouri, Kansas & Texas, which has now been out some three weeks and calls for 2500. Repairing of cars is being undertaken on a large scale by a number of roads, but no important requisitions for steel have been made in this connection. In this market mill shipment of structural material, so far as it concerns new orders, has little place in the situation for the reason that the prices being asked for prompt shipment are practically on a warehouse basis. Nominally the price of steel from mill has been advanced to the basis of 1.80c., Pittsburgh, in accordance with which we quote 1.989c., Chicago, but transactions for reasonably prompt delivery call for prices running upward from 2c., Pittsburgh.

The demand on warehouse stocks for material has now become very heavy, some single orders being so large as to completely absorb certain sizes. More than a few of these orders have been declined for that reason. We continue to quote for Chicago delivery out of store 2.30c.

Plates.—A feature of the situation, which is perhaps without precedent, appears in the surprising extent to which the smaller users of plates lack protection for even their normal volume of business in the first half. In the insistence with which some of the customers are seeking accommodation, the mills are already feeling a reflection of this fact. In the meantime, orders are being placed at prices involving high premiums. For shipment from mill we continue to quote nominally 1.989c., Chicago.

The mill situation has turned a large number of buyers of plates to the warehouses and one jobber reports orders for a total of 15,000 tons in a single day, the large part of the ma-

terials called for being plates. A single inquiry of 1100 tons is noted. We quote for Chicago delivery of plates out of store 2.30c.

Sheets.—The business in sheets is much restricted. Conditions differ somewhat from those affecting the heavier products. Inquiry is not so voluminous; on the other hand, practically all of the inquiry, even for galvanized sheets, appears to find some mill in a position to supply the material desired. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.439c.; No. 28 black, 2.689c.; No. 28 galvanized, 4.689c. to 5c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.60c.; No. 28 black, 2.90c.; No. 20 and heavier galvanized, 4.80c.; No. 22 and lighter, 5c.

Bars.—Inquiry for reinforcing bars is running into very substantial tonnages. A warehouse job alone, in connection with which California delivery is desired, calls for 8300 tons, while various other inquiries up to 2000 tons are reported. Although the builders of reinforced concrete buildings are waiving their insistence upon mild steel, the situation with respect to rail-steel bars promises but little more in view of the scarcity of rerolling rails. For bar iron there appears to be but the one quotation, 1.75c. The tonnage of new business is not sufficient to crowd the mills but specifications against old contracts are anticipating schedule deliveries. We quote mill shipments, Chicago, as follows: Bar iron, 1.75c.; soft steel bars, 1.989c.; hard steel bars, 1.80c. to 2c.; shafting, in carloads, 50 per cent off; less than carloads, 45 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 2.20c.; bar iron, 2.20c.; reinforcing bars, 2.20c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 38 per cent off.

Rivets and Bolts.—The comparatively high prices being asked for both rivets and bolts, while not being observed with absolute uniformity, are well supported by the prices and scarcity of raw materials, as well as by the heavy obligations now on the books of manufacturers. The following discounts represent the recent advance, and we quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 70-12½; cut thread, 70-5; larger sizes, 65; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 70-10-7½; cut thread, 70-12½; larger sizes, 65-10; gimlet point coach screws, 75; hot pressed nuts, square, $4.70 off per 100 lb.; hexagon, $4.50 off. Structural rivets, ¾ to 1¼ in., 2.60c. to 2.65c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote revised prices, out of store: Structural rivets, 2.80c.; boiler rivets, 2.70c.; machine bolts up to ¾ x 4 in., 70-12½; larger sizes, 65-10; carriage bolts up to ¾ x 6 in., 70-5; larger sizes, 65 off; hot pressed nuts square, $4.50, and hexagon, $4.70 off per 100 lb.; lag screws, 75.

Cast-Iron Pipe.—At Blue Island, Ill., 400 tons is to be bought next week and at Muskatine, Iowa, tenders are being asked on a like tonnage. The American Cast Iron Pipe Company has been awarded 350 tons at Atkinson, Ill. Prices have again stiffened and we quote as follows per net ton, Chicago: Water pipe, 4 in., $30; 6 in. and larger, $28, with $1 extra for class A water pipe and gas pipe.

Wire Products.—Not only are specifications, within the limits of the tonnages provided by contract, being rapidly specified, but the instances of over-specification of contracts multiply. A number of inquiries for 60-day contracts, in the first quarter, are noted, but in several instances the mills have declined to accept this business even at an advance on recent prices. Manufacturers are now asking $2 per ton more than last week. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $2.139; wire nails, $2.289; painted barb wire, $2.439; galvanized barb wire, $3.139; polished staples, $2.439; galvanized staples, $3.139, all Chicago.

Old Material.—The past week was not marked by a further jump in values comparable with the advances of the last few weeks, but, on the basis of prevailing quotations, the market exhibits unquestionable strength. While transactions at Chicago have not been so numerous, the activity in other markets and the range of prices that has been established have strongly supported values here. Interest attached very prominently to sales of busheling for Cleveland delivery. The buying of heavy melting steel appears to be limited only by the availability of material to meet the rather rigid specifications of the leading buyer. The principal railroad offering of scrap this week is the Rock Island list of 4500 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$16.00 to $16.50
Relaying rails	19.50 to 20.50
Old carwheels	14.50 to 14.75
Old steel rails, rerolling	16.75 to 17.25
Old steel rails, less than 3 ft.	16.50 to 16.75
Heavy melting steel scrap	15.75 to 16.25
Frogs, switches and guards, cut apart	15.75 to 16.25
Shoveling steel	15.25 to 15.75
Steel axle turnings	11.75 to 12.25

Per Net Ton

Iron angles and splice bars	$16.50 to $16.75
Iron arch bars and transoms	17.75 to 18.25
Steel angle bars	14.50 to 15.00
Iron car axles	19.50 to 20.00
Steel car axles	21.50 to 22.00
No. 1 railroad wrought	15.25 to 15.75
No. 2 railroad wrought	14.25 to 14.75
Cut forge	14.25 to 14.75
No. 1 busheling	13.25 to 13.50
No. 2 busheling	9.25 to 9.50
Pipes and flues	12.00 to 12.50
Steel knuckles and couplers	15.00 to 15.50
Steel springs	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	11.00 to 11.50
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	15.25 to 15.75
Machine shop turnings	8.75 to 9.00
Cast borings	7.75 to 8.00
No. 1 cast scrap	13.75 to 14.25
Stove plate and light cast scrap	11.00 to 11.50
Grate bars	11.00 to 11.50
Brake shoes	10.25 to 10.75
Railroad malleable	13.75 to 14.00
Agricultural malleable	11.50 to 12.00

Philadelphia

PHILADELPHIA, PA., Dec. 21, 1915.

Inquiry is heavier for last half deliveries of steel rounds, billets and other materials for which the war has created demand. At least one maker of billets has opened his books for the second quarter and is getting business at $55 for forging billets and $40 for open-hearth rerolling billets. The same producer is taking second quarter orders for plates at 2.25c., Pittsburgh, or 2.409c., Philadelphia. Plates do not appear to be obtainable under this price. Eastern structural mills are confronted by a heavy demand from the West and are filled with orders for the next few months. In the first half of 1916 the Pennsylvania Steel Company will roll 85,000 tons of rails for France. With the rail order the company received an order for 5000 tons of angle bars. Some Southern rail orders are pending. Makers of Virginia pig iron again have advanced prices. Eastern consumers of iron and its producers are facing a serious situation because of the railroad freight congestion. Some Eastern furnaces have only a small supply of coke and may have to shut down unless coke shipments can be got through. New England consumers of pig iron are experiencing difficulty in getting shipments, and some of them are in dire need. The difficulty is especially great where lighterage in New York harbor is necessary. Though eastern Pennsylvania mills have not begun to buy heavy melting steel scrap in any considerable quantities, it is strong. Old wrought-iron pipe has been especially active.

Pig Iron.—The freight congestion on the Eastern railroads is seriously affecting the makers and consumers of pig iron. Some of the foundries in New England face an acute shortage of iron through the failure of shipments to reach them. A carload of Virginia iron has been side-tracked at Harrisburg, Pa., for seven weeks. Some of the eastern Pennsylvania blast furnaces are short of coke and may have to shut down unless the situation is relieved. Appeals to the railroads are unavailing, as they point to the shortage of motive power and the volume of perishable freight that has to be moved; also declare that they cannot tie up their lines for a few cars of coke. All they will promise is to do the best they can. Freight which has to be lightered in New York harbor, en route to points on the New York, New Haven & Hartford Railroad, is in a particularly bad predicament, as neither lighters nor

cars are available. An effort to have a carload of pig iron brought north by steamer was unsuccessful, the steamship officials refusing to accept it. Prices have moved so fast that they are several dollars per ton higher than those paid for some of the iron to be delivered on contracts in the next few months. The Virginia Iron, Coal & Coke Company has announced as its schedule of prices for No. 2 X $18, furnace, for third quarter or last half; $17.50 for the second quarter alone, and $17.25 for the first quarter or first half. No. 2 plain is 50c. less than No. 2 X, No. 3 foundry 25c. less than No. 2 plain, and No. 4 and gray forge 25c. less than No. 3 foundry. The Virginia-Philadelphia freight rate is $2.75. The week has seen fair activity in foundry grades; none in basic. While there has been one good-sized purchase of pipe iron by a local consumer, most of the buying has been confined to lots of moderate size. A maker of eastern Pennsylvania No. 2 X is quoting $20, furnace, or $20.79, Philadelphia, and has obtained that figure for some deliveries. Another producer in the same territory is asking $20.90, Philadelphia, on the basis of $19, furnace. Other quotations for No. 2 X, Philadelphia, nearby delivery, range from $19.50 to $20, the higher prices being asked where the makers are well sold up. Some sellers of basic say they would be disinclined to let it go at $19, delivered. Standard low phophorus is unchanged at $32, delivered, at which price some fair-sized lots have been taken, while others are under inquiry. There is a growing feeling among consumers that they should protect themselves against future developments, to which may be attributed the more frequent inquiries for second half deliveries. As a matter of fact, there has not been much buying of this position, partly because it is being restricted by the sellers. A local stove manufacturer has closed for 3000 tons, last half delivery. The Norfolk & Western Railroad is ready to close for about 10,000 tons, also for the last half. An inquiry has come out for a good round tonnage of gray forge, for which one interest is asking $18.50, delivered. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.50 to $20.00
Eastern Pa., No. 2 plain	19.25 to 19.75
Virginia, No. 2 X foundry	19.50 to 20.00
Virginia No. 2 plain	19.00 to 19.50
Gray forge	18.00 to 18.50
Basic	18.50 to 19.00
Standard low phosphorus	32.00

Iron Ore.—New business in foreign ore continues at a standstill. Arrivals in the week ended Dec. 18 consisted of 7000 tons from Chile and 7750 tons from Cuba. Large tonnages of New York State ores have been purchased in this territory for 1916 delivery at prices ranging from 8.6c. to 9c. per unit, depending on quality.

Ferroalloys.—There have been a few transactions in English 80 per cent, in which $100, seaboard, was the price. Domestic producers are getting $110, furnace, for fair-sized quantities and $115 for small lots. No foreign ferromanganese arrived at this port last week, but the arrival of 31 tons of English ferrosilicon is reported. No quotations are obtainable for 50 per cent ferrosilicon. Blast-furnace ferrosilicon, 11 per cent grade, is quoted at $30, furnace, or $33.44, Philadelphia.

Bars.—The more or less nominal quotation for steel bars is 1.959c., Philadelphia, based on 1.80c., Pittsburgh. The demand is a little lighter. Iron bars, carload lots, are quoted at 2.059c., Philadelphia, and in less than carloads at 2.191c., Philadelphia, these quotations being for immediate acceptance. The market continues strong, and higher prices are predicted by the trade.

Plates.—It was said last week that an Eastern maker of plates had made its price to newcomers 2.50c., Pittsburgh, whereas the figure should have been 2.75c., Pittsburgh, its declared purpose being to ward off business. Its minimum quotation to regular customers is 2.409c., Philadelphia, based on 2.25c., Pittsburgh. At these prices another mill has opened its books for second quarter contracts. The volume of demand is maintained. The Luckenbach Steamship Company has ordered two steamships from the Fore River Shipbuilding Corporation, and the Vacuum Oil Company has ordered two from the Harlan & Hollingsworth Corporation and one from the Union Iron Works.

Structural Material.—Eastern mills quote 2c., Pittsburgh, on desirable orders, and 2.25c., Eastern mill, on Western and Southern inquiries, prices which are firm for first quarter deliveries. The 1.80c., Pittsburgh, quotation said to be quoted by some of the Western mills is said to entail deliveries at the convenience of the makers, and when this will be is most uncertain. Western demand here is strong. The principal new propositions in prospect are extensions to the new Philadelphia subway system. A spurt is expected in January. The Pennsylvania Railroad is inquiring for some small bridges.

Rails.—The Pennsylvania Steel Company has received an order from the French Government for 85,000 tons of steel rails, delivery beginning in January and extending throughout the first half. With this rail order the company received another for 5000 tons of angle bars. Some Southern rail inquiries, aggregating 15,000 to 20,000 tons, are expected to close this week.

Billets.—Billets for first quarter shipment are exceedingly difficult to locate. A leading mill is selling second quarter forging billets at $55, delivered, and open-hearth rerolling billets at $40. For the first quarter this maker has nothing to offer, a situation which prevails with other makers also. Confronted with the price, consumers ultimately say they must have the material.

Sheets.—Blue annealed sheets are very active. For No. 10 the quotation is 2.50c., Pittsburgh, or 2.659c., Philadelphia.

Coke.—Coke is becoming scarce, and, as stated in the pig-iron paragraph, certain blast furnaces are running hand-to-mouth. Spot furnace is quoted at $3 to $3.35 per net ton at oven, and first half contract furnace at $2.35 to $2.50. Prompt foundry has sold at $4. Spot foundry is quoted at $3.75 to $4 per net ton at oven, and sales have been made at the top of the range. Contract foundry is quoted at $3 to $3.50.

Old Material.—A feature of the week has been the strength of wrought-iron pipe, to be used in place of railroad wrought. The quotations for pipe have advanced to $16 and $16.50, at which prices sales have been made. Heavy melting steel continues unsettled, the mills not yet having taken hold, though they are buying other material. Brokers continue to buy heavy steel and are paying higher prices. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.00 to $16.50
Old steel rails, rerolling	18.00 to 19.00
Low phos. heavy melting steel scrap	21.50 to 22.50
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	19.50 to 20.00
Old carwheels	16.00 to 16.50
No. 1 railroad wrought	21.00 to 21.50
Wrought-iron pipe	16.00 to 16.50
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.50 to 11.00
Machine shop turnings	11.50 to 12.00
Cast borings	11.50 to 12.00
No. 1 cast	16.75 to 17.25
Grate bars, railroad	12.50 to 13.00
Stove plate	13.00 to 13.50
Railroad malleable	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, Dec. 22, 1915.—(*By Wire.*)

Pig Iron.—Taking into consideration the season, sales reported make a satisfactory record. Indiana melters contracted for several 500-ton lots of Southern foundry iron for first half shipment. Scattered sales of Northern foundry for the same delivery are also reported in Indiana and central Ohio, but nearby melters evidently have sufficient iron to carry them until July 1. A considerable quantity of Virginia iron has lately been sold in this territory, the latest lot reported being 600 tons to a Michigan consumer. Malleable is still active, but is hard to obtain for nearby shipment. A central Ohio firm bought to-day 500 tons for first half delivery. A St. Louis company placed an order through a local house for 3000 tons, and in the

list of general inquiries for malleable is one for a like tonnage from an Indiana manufacturer. A feature of the past week has been the opening of negotiations for iron for last half delivery, and while a few sales have been made the furnace interests are inclined to postpone opening their books for this delivery until after the holidays. The only open price on Southern No. 2 foundry for that shipment is $16, Birmingham basis. Northern producers are also cautious and prefer to solicit offers rather than to make any open quotations. Southern foundry iron for first half shipment has advanced and $14.50, Birmingham, is now the minimum price, with one maker asking $15.50. Northern foundry is quoted at $17.50 to $18, Ironton. The same quotations are made on malleable and basic, but both are scarce. The Ohio silvery irons are very firm at $25, furnace, for 8 per cent, and a few sales have been made at this figure. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	26.26 to 26.76
Southern Ohio coke, No. 1	19.76 to 20.26
Southern Ohio coke, No. 2	18.76 to 19.26
Southern Ohio coke, No. 3	18.26 to 18.76
Southern Ohio malleable Bessemer	18.26 to 18.51
Basic, Northern	18.26 to 18.51
Lake Superior charcoal	20.20 to 21.20
Standard Southern carwheel	24.40 to 24.90

(By Mail)

Coke.—For spot shipment Connellsville 48-hr. coke most of the leading interests are quoting from $3.10 to $3.25 per net ton at oven and on 72-hr. from $3.50 to $4, but contract business would be acceptable from 50c. to 75c. per ton below the figures named. A local selling agency for Wise County producers has received instructions to-day to take on no business for foundry coke below $3.50 at oven for shipment up to July 1. Furnace coke in that field is quoted for nearby shipment around $3 to $3.25. New River and Pocahontas operators are also holding out for the same prompt shipment prices, but are willing to make concessions where future contracts are involved. Shipments are going forward at a satisfactory rate and so far the car shortage has not seriously affected the situation in this territory.

Finished Material.—Contrary to expectations, the holiday season has not appreciably affected local warehouse business. The rolling mills report also a good run of orders for both black and galvanized sheets. The mill price on No. 28 black sheets is unchanged at 2.65c., Cincinnati, and Newport, Ky.; No. 28 galvanized, 5.15c., and No. 10 blue annealed, 2.55c. A limited quantity of No. 28 galvanized sheets can be bought to-day from local jobbers' stocks at 5c. The warehouse discount on cold-rolled shafting is 40 per cent off and 38 per cent on flats, squares and hexagons. The store price on steel bars remains at 2.35c., and on structural shapes 2.45c. Wire nails are higher and are quoted by wholesale houses at $2.15 base per keg, Cincinnati.

Old Material.—The market is very firm and advances have been made on practically all grades of scrap. No. 1 railroad wrought seems to be very much in demand. Large tonnages of scrap are being shipped not only to the rolling mills but also to the steel and gray-iron foundries. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$11.00 to $11.50
Old iron rails	15.75 to 16.25
Relaying rails, 50 lb. and up	21.25 to 21.75
Rerolling steel rails	15.00 to 15.50
Heavy melting steel scrap	14.50 to 15.00
Steel rails for melting	14.25 to 15.25

Per Net Ton

No. 1 railroad wrought	$13.75 to $14.25
Cast borings	8.00 to 8.50
Steel turnings	7.75 to 8.25
Railroad cast scrap	12.00 to 12.25
No. 1 machinery cast scrap	13.75 to 14.25
Burnt scrap	9.00 to 9.50
Iron axles	19.50 to 20.00
Locomotive tires (smooth inside)	13.50 to 14.00
Pipes and flues	10.50 to 11.00
Malleable and steel scrap	11.00 to 11.50
Railroad tank and sheet scrap	9.00 to 9.50

Birmingham

BIRMINGHAM, ALA., Dec. 20, 1915.

Pig Iron.—As far as furnace operators are concerned the iron available at $14 has disappeared and nothing under $14.50 is to be had. All except the leading interest are quoting $15 and report sales on that basis for first half, while the leading interest does not admit having any more for sale under $14.50. The Republic and Sloss-Sheffield companies have been asking $15 since Dec. 6 and 7. One lot has been sold for delivery into the second half at $16. An offer of $14.50 for 3000 tons of iron for second half was declined. In a quiet way one iron company has made large bookings during the month. Others have not sold so freely because they have nothing to offer. The leading interest, for instance, has no spot iron and is selling only for first half. Some concern is felt in delay of deliveries owing to the car shortage. Some delay has been experienced in starting the shipments of the Sloss-Sheffield's Florence and Sheffield iron by river barge lines to Cairo and other gateways, but they are expected to start soon. President J. C. Maben, now in Birmingham, says his company is considering the building of a by-product plant, but has not yet reached a decision. He states that its five active stacks, owing to plant improvement, are making 450,000 to 475,000 tons of pig iron annually, which is 100,000 tons in excess of the output of seven stacks a few years ago. The Gulf States Steel Corporation is considering the building of a by-product plant at its steel works in Alabama City, where local interests are now raising a fund with which to purchase a site to be offered for the plant. The Tennessee Company has one furnace on ferromanganese, but none of the output is for the general market, the company consuming its own production. The Alabama Company has sold ahead as much iron as it desired and is out of the market for the time, declining to name prices for the second half. Last week's industrial payroll of the Birmingham district reached $750,000, the largest on record. It is understood that three different factories in this district are building machinery for the Allies. Lathes are understood to be one of the items and gasoline engines another.

Alabama's pig iron output in 1916 will break all records. It will run a little over 2,000,000 tons. The Alabama freight movement in November was 82,877 cars, an increase over November, 1914, of 24,633 cars. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.00 to $15.50
No. 2 foundry and soft	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 4 foundry	13.75 to 14.25
Gray forge	13.50 to 14.00
Basic	14.50 to 15.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—All pipe makers report that both the present status and the outlook are good. Even the soil pipe manufacturers admit that they see an approach to a normal output, their shops now running 80 to 85 per cent of capacity. Twenty-five soil pipe makers met in Birmingham a few days ago, but nothing regarding the conference was made public. Indications of big water and gas pipe lettings in the Middle West are increasing. Forward deliveries on pipe are quoted 50c. per ton above spot. We quote, per net ton, f.o.b. pipe shop yards, spot, as follows: 4-in., $23.50; 6-in. and upward, $21.50, with $1 added for gas pipe.

Coke and Coal.—Coke gathers a little strength each week, the output moving rapidly from the ovens. Prices quoted are firmly maintained. Brookwood coke is commanding $3.50 and Yolande $3.75. General quotations, per net ton, f.o.b. oven, are as follows: Beehive furnace, $2.75 to $3; foundry, $3.25 to $3.50. The demand for coal has picked up, with greater industrial activity. Railroad consumption is aiding much in the re-establishment of the market's equilibrium, while the withdrawal of the furnace companies from the general field has also benefited the independents. Maximum operations, however, have not yet been reached.

Old Material.—Dealers report a brisk demand from consumers for all the available steel scrap, and the foundry demand is also good. Light cast and stove

have been sold in large quantities. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.00 to 14.50
Old iron rails	13.50 to 14.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.50 to 10.00
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.50
Tram carwheels	10.00 to 10.50
Stove plate	8.00 to 8.50

New York

NEW YORK, Dec. 22, 1915.

Pig Iron.—The market has grown quieter, and with no great amount of new inquiry coming in it is likely that matters will drift on through the holiday season. A Connecticut sale of 2000 tons was made last week and a New Jersey transaction of 1250 tons is reported. Northern and Southern irons figured in both. Some Southern iron has sold at $15, Birmingham, for No. 2. A transaction of the past week in which a soil pipe interest bought 2000 tons of iron for delivery at Newark in the second half of 1916 showed that furnaces are not inflexible at the high prices named from time to time as advances are announced. This interest bought No. 2 X, No. 2 plain and No. 3 irons and the quotations represented intervals of of 50c. from grade to grade. It is understood that the accepted prices show an average for the three grades of less than $19 delivered. Apparently Buffalo resale iron figured here, the freight from Buffalo being $1.85. An inquiry for 5000 to 10,000 tons of low phosphorus pig iron for delivery throughout 1916 has been put out by a New Jersey manufacturer of alloy steel. Recently $30 at furnace has been quoted on such iron. Further sales of Buffalo speculative iron are being made, and the basis is now $17.75 at furnace for No. 2 plain. Eastern Pennsylvania furnaces have little iron to offer for the first quarter. Shipments to New England were embargoed last week and on the Pennsylvania Railroad an embargo is still in force in Eastern districts. A New England embargo on coke, which was an embarrassment to foundries in that section last week, was released this week. For foundry coke $4 at oven has been paid, while furnace coke is sold from $3 to $3.50 at ovens for prompt delivery. A New Jersey furnace has been banked in the past week because of difficulty in securing coke. The principal Virginia producer has announced an advance to $18 at furnace for No. 2 X for the second half of 1916, and is quoting $17.25 for prompt first quarter and first half iron and $17.50 for second quarter alone. There have been some negotiations for second half of next year, chiefly with Buffalo furnaces, but most eastern Pennsylvania producers do not care to enter business now for that delivery. More than 50 per cent of their customers' wants for first half are covered. We quote at tidewater as follows for early delivery: No. 1 foundry, $19.50 to $20; No. 2 X, $19 to $19.50; No. 2 plain, $18.50 to $18.75. Southern iron at tidewater, $19.50 to $19.75 for No. 1 and $19 to $19.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British ferromanganese is firm at $100, seaboard, on contract, but little spot material can be obtained below $110. Estimates place the sales the past week by various British representatives at 5000 tons for forward delivery at $100, seaboard. Sales of the domestic alloy have been made at $110 to $115, furnace, depending on the tonnage involved. Receipts from Great Britain continue at the rate of the past few months, 4000 to 5000 tons per month. Spiegeleisen is quiet and 50 per cent ferrosilicon is very active, the demand being strong and the consumption probably larger than ever. The last quotation was $85 to $87, Pittsburgh.

Finished Iron and Steel.—The embargo on freight to seaboard terminals has aggravated the delivery question not alone, of course, for exports, but for domestic shipments requiring travel toward seaboard. Fabricated steel work is none too brisk locally, but railroad bridge work looks more promising, with the Pennsylvania and the Baltimore & Ohio systems in mind. Plain material at 1.70c., Pittsburgh, is scarcer. A few hundred tons, indeed, picked up in the mill yard and containing lengths and sizes possibly not of immediate value to the buyer, have commanded 2.25c., Pittsburgh, though, of course, for immediate shipment. The awards of the week include 700 tons for coal bunkers for the Public Service Corporation at Newark, given to the American Bridge Company, which has also 450 tons for the Unionport bridge, New York; 700 tons additional Southern Railway work, 600 given to the Virginia Bridge & Iron Works; 500 tons for the Bullard Machine Tool Company, Bridgeport, Conn., given to the Levering & Garrigues Company; 500 tons for the Hooker Electrolytical Chemical Company, Buffalo, to the Ferguson Iron & Steel Company, and 350 tons for a studio building, West Fifty-third Street, to the William B. Shafer Company. A Y. M. C. A. building, 124th Street and Seventh Avenue, taking 1100 tons, is again under consideration; in fact, the contract for the steel is regarded as practically closed. Other new work embraces 600 tons for a Paterno apartment, West Eighty-fourth Street, 300 tons for a courthouse at Durham, N. C., and 250 tons for two bridges for the Lehigh Valley. Car buying is not of large proportions, though a brisker situation is expected after the turn of the year. The scarcity of steel bars and the demand for bar iron has resulted in another $2 per ton advance for this commodity. We quote mill shipments of steel bars nominally at 1.869c., New York, with 1.969c. and higher for deliveries as the mill can make them; plates at 1.969c. and 2.419c., New York, the former price in six or seven months and the latter in four months; structural shapes at 1.969c. to 2.25c., New York, according to size of order and urgency of shipment, and iron bars at 2.069c., New York. For warehouse buying we quote iron and steel bars and structural material at 2.40c. and steel plates at 2.50c.

Cast-Iron Pipe.—John Fox & Co., representing the Donaldson Iron Company, were the successful bidders Dec. 20 on 425 tons for the city of Yonkers, N. Y. It is expected that the city will take about 40 per cent more than the quantity asked. No further municipal lettings are announced, but an excellent volume of business is being booked from private gas and water companies. It is expected that public lettings will become more numerous after the opening of the new year. Prices are $1 per ton higher. Carload lots of 6-in., class B and heavier, are quoted at $28 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Not much business is reported in steel scrap, but the demand for other classes of old material is stronger and prices are higher. Pittsburgh prices on steel scrap are maintained at much above the parity with eastern Pennsylvania, and consequently two sets of quotations on this class of material are still necessary. The scarcity of railroad wrought scrap, with the continued strong demand from bar-iron mills, has caused other kinds of rolling-mill material to advance. Brokers are paying about as follows to local dealers and producers per gross ton, New York:

Railroad steel scrap or equivalent	$14.50 to $15.00
Heavy melting steel scrap, yard stock (E. Pa. spec.)	13.00 to 13.50
Relaying rails	21.50 to 22.00
Rerolling rails	16.00 to 16.50
Iron car axles	24.50 to 25.00
Steel car axles	26.50 to 27.00
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron track scrap	17.00 to 17.50
No. 1 yard wrought, long	16.00 to 16.50
No. 1 yard wrought, short	15.50 to 16.00
Light iron	5.25 to 5.50
Cast borings	9.25 to 9.50
Wrought turnings	9.25 to 9.50
Wrought pipe	13.50 to 14.00
Old carwheels	13.75 to 14.00
Malleable cast (railroad)	12.50 to 13.00

Cast scrap is growing scarce and much higher prices are being named. Dealers' quotations to consumers of cast scrap are as follows per gross ton, New York:

No. 1 cast (machinery)	$16.00 to $16.50
No. 2 cast (heavy)	15.00 to 15.25
Stove plate	11.50 to 12.00
Locomotive grate bars	11.50 to 12.00

Pittsburgh

PITTSBURGH, PA., Dec. 21, 1915.

The Pennsylvania and other railroads have placed an embargo on all shipments of iron and steel products routed to New York City for lighterage, and at the moment not a pound of this kind of freight is now being loaded for seaboard or export shipment. How long this condition will last is uncertain, but it is likely to work a radical change in the situation as regards deliveries of material to domestic consumers. The larger steel and wire companies that have been making heavy export shipments. and this applies to sheets, tin plate and the lighter forms of steel products, will now be able to divert this material to domestic consumers, who are likely to get, and very soon, much quicker deliveries than for some time. Were the situation not so strong, this might have the effect of unsteadying prices, but it is not believed this will be the case, for a time at least. If it lasts any considerable time, it will certainly prove a blessing to domestic consumers, who have been importuning the mills for months for more material on their contracts than they have been getting. The local steel situation has taken on the usual holiday quietness, and the week has been without special features. The question is being asked whether the market is in a top-heavy condition, and some in the trade believe it is. Steel bars and shapes at 1.80c. are high, and plates at 1.90c. to 2.25c. do not offer much encouragement for taking up new projects, except such as are actually needed for existing work. At any rate there is not much new buying, and whether the consuming trade will come in the market and place orders in January at existing prices remains to be seen.

Pig Iron.—There is no new inquiry for basic iron, and only slight inquiry for Bessemer iron and in small lots. The last large sale of basic iron in this district was to the Colonial Steel Company and this is reported to have been sold at less than $18, Valley furnace. It is stated that when the Edith and Neville Island furnaces of Carnegie Steel Company are started up, shortly after Jan. 1, their product is to be shipped to the Illinois Steel Company. It is said that a sale of Bessemer iron is likely to go through in a day or two at close to $20, Valley furnace, but this has not yet been done. A sale of 1500 tons of basic for first quarter is reported at $18, Valley furnace. We quote: Standard Bessemer iron, $19; basic, $18; malleable Bessemer, $17.50; No. 2 foundry, $18.50; gray forge, $17.25, all at Valley furnace. The freight rate for delivery to the Cleveland and Pittsburgh districts is 95c. per ton.

Billets and Sheet Bars.—There is still a great scarcity in the supply of Bessemer and open-hearth billets. A local interest states that it has sold within a few days between 2500 and 3500 tons of open-hearth billets, deliveries within sixty days from date of contract, at $35, maker's mill. This price represents a premium of at least $3 per ton that the buyer paid to get his steel fairly promptly. We quote, for delivery at convenience of the mill, Bessemer billets and sheet bars at $30 to $31, and open-hearth billets and sheet bars at $31 to $32, maker's mill, Pittsburgh or Youngstown districts. We quote forging billets at $52 to $55, for sizes up to but not including 10 x 10 in. and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra. Axle billets are held at $48 to $50.

Ferroalloys.—The situation in ferromanganese seems to be tightening on account of the very high rates of freight charged on foreign manganese ores. English 80 per cent is offered at about $110, seaboard, without guarantee as to deliveries, while domestic 80 per cent is quoted at $115 to $120 at furnace. There is a fairly active inquiry. Prices of Bessemer ferrosilicon for delivery in second quarter of 1916 are as follows: 9 per cent, $27; 10 per cent, $28; 11 per cent, $29; 12 per cent, $30; 13 per cent, $31.50; 14 per cent, $33.50; 15 per cent, $35.50, and 16 per cent, $38. Seven per cent silvery for same delivery is $24.50; 8 per cent, $25; 9 per cent, $25.50; 10 per cent, $26; 11 per cent, $27, and 12 per cent, $28. All these prices are f.o.b. at furnace, Jackson, Ohio, New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, $85; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, delivered in the Pittsburgh district.

Plates.—The minimum price on plates now quoted by any of the makers for shipment at convenience of the mill is 1.80c., but for shipment within three to four weeks 1.90c. to 2.25c. at mill is quoted. All the mills are loaded with orders, and it is almost impossible to get promises of deliveries inside of four weeks or longer. New inquiry for cars is light. It is stated the Pennsylvania Railroad is still figuring on 18,000 to 20,000 cars, but the prices offered by the road for these cars are so low the steel car builders will not entertain them. The French Government is said to be in the market for 5000 freight cars. The Standard and Pressed Steel Car companies are reported filled for the next two to three months.

Structural Material.—Local fabricators are filled for four to six months and are not bidding actively on new work coming up. The Jones & Laughlin Steel Company has taken 1500 tons of shapes for the eight open-hearth furnaces to be built by the Inland Steel Company, Chicago, and 500 tons for the Nyanza mills at Woonsocket, R. I. The American Bridge Company has taken 1200 tons for two additional stories to the Frick Arcade Building in this city. Reports that the Riter-Conley Mfg. Company had taken 2000 tons for a large power house near Wheeling, W. Va., are wrong, as this contract has not yet been placed. We quote beams and channels up to 15 in. at 1.80c. to 1.90c., f.o.b. maker's mill, Pittsburgh.

Steel Rails.—Export inquiry for standard sections and light rails is heavy, but domestic orders for standard sections are mostly for small lots for quick delivery and ranging from 300 tons up to in a few cases 1000 tons. The new demand for light rails is still very active, the Carnegie Steel Company taking new orders and specifications in the past week for over 4000 tons. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b., Pittsburgh. We now quote light rails as follows: 25 to 45-lb. sections, 1.55c.; 16 and 20 lb., 1.60c.; 12 and 14 lb., 1.65c.; 8 and 10 lb., 1.70c., in carloads, the usual advances being charged for less than carloads.

Sheets.—The American Sheet & Tin Plate Company has advanced its price on black sheets to the basis of 2.60c. for No. 28 gage, but some makers are still quoting 2.50c., though not promising deliveries inside of three to four months. A local interest has taken an order for over 5000 tons of blue annealed sheets to be used in steel cars that the Pennsylvania Railroad will build in its own shops. All the sheet mills are running practically full and have a large amount of work ahead. For delivery through first quarter we quote Nos. 9 and 10 blue annealed sheets at 2.25c.; No. 28 Bessemer black, 2.50c., and No. 28 galvanized, 4.75c. We quote Nos. 22 and 24 gage black plate, tin mill sizes, H. R. and A., at 2.30c. to 2.40c.; Nos. 25, 26 and 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c., and No. 30, 2.50c. These prices are for carload and larger lots, f.o.b. maker's mill.

Tin Plate.—Consumers are placing contracts for 1916 delivery at a fairly active rate, but it is said a few of the larger consumers are waiting to see whether the price of $3.60 will hold firm. It is claimed that several of the very largest dealers have already placed their contracts at $3.50 per base box, but in no case has a lower price been made. Tin-plate mills are running nearly full and have work ahead for two or three months. We quote 14 x 20 coke plates at $3.50 to $3.60 per base box for delivery over remainder of this year, and $3.60 per base box for delivery over all of 1916. We quote terne plate, 14 x 20, 8-lb. coating, at $3.40 to $3.50 per box, f.o.b., Pittsburgh.

Railroad Spikes.—New railroad inquiry is light, but jobbers are specifying freely and prices are firm. We quote standard spikes, larger than ½ in., at $2.10; from ½ in. to ⅜ in., $2.20, and 5/16 in. and ⅜-in. diameter, $2.35, per 100 lb., f.o.b. at mill.

Skelp.—New demand has quieted down, but the skelp mills are filled up for two or three months and prices are very firm. We quote grooved steel skelp at 1.70c. to 1.75c.; sheared steel skelp, 1.80c. to 1.85c.; grooved iron skelp, 2.10c. to 2.15c., and sheared iron skelp, 2.20c. to 2.25c., all delivered to consumers' mills in the Pittsburgh district.

Wire Rods.—It is said export inquiries are in the market at present for over 60,000 tons of rods, but it is not likely any part of this business, if it is placed, will come to local mills as their obligations now will take their entire output of rods over the next four or five months. We quote Bessemer, open-hearth and chain rods at $40, maker's mill, and it is said $42 or higher has been offered for prompt rods without getting them.

Wire Products.—Effective Monday, Dec. 20, prices on wire nails and all grades of wire were advanced $2 per ton, discounts on woven wire fencing being lowered one point. The embargo on nails routed to seaboard points for export shipment will likely result in much better deliveries being made in the near future to domestic customers. Three of the largest makers of wire and wire nails in the Pittsburgh district are out of the market as active sellers, and say they have no product to offer for delivery before April or May. Prices now being quoted to the large trade and for shipment at convenience of the mill, are as follows: Wire nails, $2.10; galvanized nails 1 in. and longer taking an advance over this price of $2, and shorter than 1 in., $2.50; plain annealed wire, $1.95; galvanized barb wire and fence staples, $2.95; painted barb wire, $2.25; polished fence staples, $2.25, all f.o.b., Pittsburgh, with freight added to point of delivery; terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 67½ per cent off list for carload lots, 66½ per cent for 1000-rod lots, and 65½ per cent for small lots, f.o.b., Pittsburgh.

Hoops and Bands.—Effective Friday, Dec. 17, the Carnegie Steel Company advanced its price on steel hoops to 2c., and two other makers say they have adopted the same price. The demand is reported heavy for both hoops and bands, with the mills sold up for four or five months ahead. We quote steel bands at 1.80c., with extras as per the steel bar card, and steel hoops at 2c., Pittsburgh.

Shafting.—Two local makers have lowered discounts on shafting to 45 per cent off in carloads and 40 per cent in less than carloads, but one leading maker is still quoting the old discounts. It is not a question of price in shafting, but to find any makers that can promise delivery inside of four to six months. We quote cold-rolled shafting at 50 per cent off in carloads and 45 per cent in less than carloads, f.o.b. Pittsburgh, but for reasonably prompt delivery there would be no trouble in selling shafting at 45 per cent off in carloads.

Cold-rolled Strip Steel.—With their output sold for the next four to six weeks, makers are not quoting on new orders, except to regular customers and then only for shipment at their convenience. For prompt shipment premiums over the base price would be paid. Export inquiry is very quiet. We quote cold-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., $3.50, delivered. Extras are as follows:

0.10 to 0.19 Carbon—1½ In. and Wider

Coils			Lengths 24 In. and Over	
Hard	Soft		Hard	Soft
Base	$0.25	100 and heavier	$0.10	$0.35
$0.05	0.30	0.050 to 0.099	0.20	0.45
0.20	0.45	0.035 to 0.049	0.35	0.60
0.35	0.75	0.031 to 0.034	0.60	1.00
0.45	0.85	0.025 to 0.030	0.85	1.25
0.55	0.95	0.020 to 0.024	1.05	1.45
1.35	1.35	0.017 to 0.019	2.45	2.45
1.75	1.75	0.015 to 0.016	2.85	2.85
2.45	2.45	0.013 to 0.014	3.70	3.70
2.80	2.80	0.012	4.30	4.30
3.15	3.15	0.011	4.65	4.65
3.50	3.50	0.010	5.00	5.00

Extras for soft apply for all intermediate tempers.

Iron and Steel Bars.—The steel-bar mills are congested with orders and on some sizes are back in delivery from 8 to 10 weeks. There is still a heavy demand for steel rounds for shrapnel purposes, but little of this business is coming to local mills as they cannot make the deliveries. The minimum price on steel bars for delivery in second and third quarter is 1.80c., but for reasonably prompt delivery as high as 2c. is quoted, and from stocks in warehouse 2.25c. and higher. We quote refined iron bars at 1.80c. to 1.85c., and railroad test bars 1.95c. to 2c., in carload lots, f.o.b. Pittsburgh.

Rivets.—Local makers say they are filled for three to four months, but, as an embargo has been placed on rivets for export shipment, the supply available for domestic users will be increased. We quote button-head structural rivets, ½ in. and larger, at $2.50, and cone-head boiler rivets at $2.60 per 100 lb., in carload lots, f.o.b. Pittsburgh, smaller lots bringing about 10c. advance.

Nuts and Bolts.—The export and domestic demand is still very heavy. Discounts for prompt acceptance are as follows:

Carriage bolts, small, rolled thread, 70 & 12½ per cent off; small, cut thread, 70 & 5; large, 65. Machine bolts with h. p. nuts, small, rolled thread, 70 & 10 & 7½; small, cut thread, 70 & 12½; large, 65 & 10. Machine bolts with c. p. c. & t. nuts, small, 70; large, 60 & 10. Bolt ends, with h. p. nuts, 65 & 10; with c. p. nuts, 60 & 10. Lag screws (cone or gimlet point), 75. Rough stud bolts, 60. Forged set screws and tap bolts, 40. Hot pressed square nuts, tapped or blank, $4.50 off list; hexagon, $4.70 off. C. p. c. & t. square nuts, tapped or blank, $4.00 off; hexagon, $5.25 off. C. p. plain square nuts, tapped or blank, $4.00 off; hexagon, $4.20 off. Semi-finished hexagon nuts, 80 per cent off. Finished and case-hardened nuts, 75 & 10. Rivets, 7/16 in. diameter and smaller, 70 & 10. These prices are delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.

Merchant Steel.—Makers are filled with orders until next April or longer, and say that if they could ship out material in three or four weeks they could get premiums of $3 to $4 per ton. We quote for small lots: Iron finished tire, ½ x 1½ in. and larger, 2.05c. base; under ½ x 1½ in., 2.20c.; planished tire, 2.25c.; channel tire, ¾ to ⅞ and 1 in., 2.55c. to 2.65c.; 1 x ⅛ in. and larger, 2.95c.; toe calk, 2.65c. to 2.75c., base; flat sleigh shoe, 2.40c.; concave and convex, 2.45c.; cutter shoe, tapered or bent, 2.95c. to 3.05c.; spring steel, 2.65c. to 2.75c.; machinery steel, smooth finish, 2.45c.

Carwheels.—It is reported that the Pennsylvania Lines West have placed order for 17,200 steel carwheels to equip the 2150 cars recently bought from Haskell & Barker and the American Car & Foundry Company. We quote 33-in. freight carwheels in lots of 1000 or more at $18; 33-in. tender wheels, $21; 36-in. passenger or tender wheels, $25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Wrought Pipe.—The new demand for wrought iron and steel pipe is heavier than for a long time, and the outlook for the pipe trade in the first half of next year is excellent. The mills are now running close to capacity and discounts are firm.

Boiler Tubes.—The new demand for locomotive tubes is abnormally heavy and for merchant tubes is also quite active. Discounts are firmly held.

Coke.—On account of the coming holidays and the fear of a shortage in supply, prompt furnace coke is higher, although the demand is not heavy. It is reported that from 12,000 to 15,000 tons of high-grade furnace coke has been sold for reasonably prompt shipment at $3.50 per net ton at oven. A sale of ten cars for spot shipment is reported at $3.65 at oven. Blast furnaces are pretty well covered on their supply of coke for first half or some for all of next year, and new inquiry is light. Several large users have not yet covered, but seem content to buy from month to month. We quote best grades of blast furnace coke for prompt shipment at $3.25 to $3.50, and on contracts from $2.40 to $2.50 per net ton at oven for first half. Best grades of 72-hr. foundry coke for prompt shipments are firm at $3.25 to $3.50 and on contracts $3 to $3.25 per net ton at oven. The Connellsville *Courier* reports the output in the upper and lower Connellsville regions for the week ended Dec. 11 as 451,896 net tons, an increase over the previous week of 14,645 tons. This is the largest output in a week for over two years.

Old Material.—Prices on all grades of scrap are very firm, but new inquiry is only fairly active. This

is likely due to the near holiday season, the mills as a rule not caring to take in more scrap in the latter part of December than they actually need. It is said that large lots of heavy steel scrap cannot be had at less than $18, but so far very few consumers have paid this price. A good deal of scrap that has been held by dealers and others for a higher price has lately come in the market, and the supply is better. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$17.50 to $18.00
Compressed side and end sheet scrap	16.00 to 16.25
No. 1 foundry cast	15.25 to 15.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	13.25 to 13.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	17.50 to 17.75
No. 1 railroad malleable stock	15.00 to 15.50
Railroad grate bars	10.75 to 11.00
Low phosphorus melting stock	21.50 to 22.00
Iron car axles	23.50 to 24.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	23.00 to 23.50
No. 1 busheling scrap	14.50 to 15.00
Machine shop turnings	9.50 to 10.00
Old carwheels	14.00 to 14.50
Cast-iron borings	10.50 to 10.75
*Sheet bar crop ends	17.00 to 17.50
Old iron rails	16.00 to 16.50
No. 1 railroad wrought scrap	17.00 to 17.50
Heavy steel axle turnings	13.00 to 13.50
Heavy breakable cast scrap	13.50 to 14.00

*Shipping point.

Cleveland

CLEVELAND, OHIO, Dec. 21, 1915.

Iron Ore.—The buying rush is over, although considerable activity is expected after the holidays as some furnaces have not yet placed contracts for their requirements. The sales during the week were quite heavy. Most consumers, particularly the steel plant interests, are buying more ore than during any previous season. However, some of the merchant furnaces are going rather slow in buying ore for nearly 18 months ahead at the higher prices. Sales of round lots have been made to the Midvale Steel Company and two or three other Eastern consumers. Some siliceous Bessemer ore is moving at $2.35 per ton as compared with $1.90 last year. Non-Bessemer siliceous ore is quoted at about $2. We quote prices as follows, delivered at lower Lake ports: Old range Bessemer, $4.50; Mesaba Bessemer, $4.20; Old range non-Bessemer, $3.75; Mesaba non-Bessemer, $3.55.

Pig Iron.—While buying is not active, being confined mostly to small lots of foundry iron, the market is very firm and prices have been advanced about 50c. a ton. In Cleveland, $18.50 is now the minimum price for No. 2 foundry and the Valley price ranges from $18.50 to $19, some sales being made at the latter figure. In Toledo the minimum quotation is $18. Considerable inquiry is coming from Eastern consumers for foundry iron contracts for the first half. Several producers have very little iron left to sell for that delivery. A moderate volume of business is being placed in Southern foundry iron contracts, mostly for the second quarter, at $14.50, Birmingham, for No. 2. We note the sale of two 1000-ton lots of Southern charcoal iron in the Pittsburgh territory for the last half delivery. We quote, delivered Cleveland, as follows:

Bessemer	$19.95
Basic	18.80
Northern No. 2 foundry	18.80
Southern No. 2 foundry	$18.00 to 18.50
Gray forge	18.30
Jackson Co. silvery 8 per cent silicon	26.62
Standard low phos., Valley furnace	31.00

Coke.—Foundry coke for prompt shipment is in fairly good demand and has stiffened up. Some consumers did not cover for all their requirements and others are not getting their coke as fast as needed, owing to delays in shipments. Standard makes of foundry coke are quoted at $3.50 to $4 per net ton at oven for prompt shipment and $3 to $3.50 for contract. Furnace coke is quoted at $2.35 to $2.50 for first half contracts.

Finished Iron and Steel.—There is considerable inquiry for structural material for specific work, some of this being wanted for shipment in the spring. Owing to the condition of the trade, prospective purchasers are canvassing the market to learn what deliveries they can secure. Among new inquiries is one from the Cincinnati, Hamilton & Dayton Railroad for 1000 tons of steel for bridge work, and others aggregating about 7500 tons for building and other structural work. The plate situation has grown tighter and local mills are making sales at a minimum of 2.50c., Pittsburgh, for shipment in four weeks or longer. While the nominal quotation on steel bars, plates and structural material is 1.80c., Pittsburgh, for future delivery, consumers who want steel for early delivery are showing little concern regarding prices. They wish to be assured of deliveries at the specified date, the price being a secondary consideration. Leading producers have practically nothing to sell and steel bars are very hard to find except in warehouses. Iron bars are firm at 1.80c., Pittsburgh, and hard steel bars are quoted at 1.75c., Pittsburgh. Sheets are very firm at 2.50c. to 2.75c. for No. 28 black, 2.25c. to 2.50c. for No. 10 blue annealed and 4.75c. to 5c. for No. 28 galvanized. Prices of wire products have been advanced $2 per ton to 2.10c. for nails and 1.95c. for plain wire. The Lackawanna Steel Company has taken 1500 tons of rails for the Ann Arbor Railroad. The warehouse price on shafting has been advanced from 40 per cent off to 35 per cent off. Other warehouse prices are unchanged. We quote steel bars, plates and structural material out of stock at 2.50c., 2 in. and larger rounds at 3c. and 2 in. and larger squares at 2.65c.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is very heavy both in specifications on contracts and current orders and considerable business in the first quarter contracts is being placed, although some makers are avoiding taking contracts as much as possible. The demand for rivets continues heavy. We quote rivets at 2.50c., Pittsburgh, for structural and 2.60c. for boiler rivets for carload lots. Shipments of bolts, nuts and rivets for the Eastern and export trade are being delayed by railroad embargoes. Bolt and nut discounts are as follows:

Common carriage bolts ⅜ by 6 in., smaller or shorter, rolled thread, 70 and 12½, cut thread, 70 and 5, larger or longer, 65; machine bolts with h. p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 70, 10 and 7½, cut thread, 70 and 12½, larger and longer, 65 and 10; lag bolts, gimlet or cone point, 75, square h. p. nuts, blanked or tapped, $4.50 off list; hexagon h. p. nuts, blanked or tapped, $4.70 off; c. p. c. and t. square nuts, blank or tapped, $4 off; hexagon nuts, all sizes, $5.25 off; cold pressed semi-finished hexagon nuts, all sizes, 80 off.

Old Material.—The market is not active but prices are very firm and higher quotations are being made on several grades. Transactions are mostly between dealers, although mills having large stocks are taking on some additional tonnage for January shipment. Many dealers are holding their scrap for higher prices, which they look for in January. Railroad wrought scrap has advanced $2 or more per ton, one dealer being in the market for this scrap at $17.50 per net ton. Borings and turnings are also higher and are now quoted at the same price, the large production borings having the effect of placing these grades on the same level. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	$15.75 to $16.00
Old iron rails	17.00
Steel-car axles	23.00 to 24.00
Heavy melting steel	15.75 to 16.25
Old carwheels	13.00 to 13.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	13.50 to 13.75
Railroad malleable	16.00 to 16.25
Steel axle turnings	12.50 to 12.75
Light bundled sheet scrap	12.75 to 13.25

Per Net Ton

Iron car axles	$22.00 to $23.00
Cast borings	7.50 to 7.75
Iron and steel turnings and drillings	7.50 to 7.75
No. 1 busheling	12.50 to 12.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.25 to 10.50
Stove plate	9.50

St. Louis

ST. LOUIS, MO., Dec. 20, 1915.

Pig Iron.—Considerably sharper demand has developed for all classes and grades. Foundries have evidently reached the conclusion that if they are to protect themselves against the improvement in business and higher prices now is the time. In consequence the total sales of the week show a large increase over the more recent similar periods. No representative is permitted now to close without first submitting the transaction to the furnace, even on amounts below 100 tons. For last half there is decided indisposition to accept prices now prevailing or to make definite quotations for large tonnages for late delivery. Sales include one of 3000 tons of malleable, one of 2000 tons of malleable, several of 500 tons of No. 2 Southern, a considerable number of 200-ton lots and one of 400 tons, including some high silicon, high manganese and special analysis iron.

Coke.—Demand as shown by specifications on contracts is increasing, but no new contracts of importance have been made.

Finished Iron and Steel.—The Missouri, Kansas & Texas has ordered 1000 steel underframes from the Commonwealth Steel Company and a 10-story terminal building at Lincoln, Neb., has been awarded to the Selden-Breck Construction Company, St. Louis. Movement out of warehouse continues very free at these prices: Soft steel bars, 2.25c.; iron bars, 2.20c.; structural material, 2.35c.; tank plate, 2.35c.; No. 10 blue annealed sheets, 2.65c.; No. 28 black sheets, cold rolled, one pass, 3c.; No. 28 galvanized sheets, black sheet gage, 5.10c.

Old Material.—All classes of industries are taking material freely. The prices continue to be marked up here and there, and the dealers are buying for the future as well as for the present demand. Lists out during the week include 800 tons from the Chicago & Eastern Illinois and 200 tons from the Toledo, Peoria & St. Louis. In relaying rails there is a large tonnage being offered by the Chicago, Milwaukee, St. Paul & Omaha, and these are likely to go at good prices. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$15.50 to	$16.00
Old steel rails, re-rolling	16.50 to	17.00
Old steel rails, less than 3 ft	16.50 to	17.00
Relaying rails, standard section, subject to inspection	21.00 to	23.00
Old carwheels	13.50 to	14.00
No. 1 railroad heavy melting steel scrap	15.50 to	16.00
Heavy shoveling steel	13.50 to	14.00
Frogs, switches and guards cut apart	15.00 to	15.50
	Per Net Ton	
Iron angle bars	$14.50 to	$15.00
Steel angle bars	14.00 to	14.50
Iron car axles	20.00 to	20.50
Steel car axles	21.00 to	21.50
Wrought arch bars and transoms	17.00 to	17.50
No. 1 railroad wrought	14.50 to	15.00
No. 2 railroad wrought	14.00 to	14.50
Railroad springs	14.50 to	15.00
Steel couplers and knuckles	15.00 to	15.50
Locomotive tires, 42 in. and over, smooth inside	14.50 to	15.00
No. 1 dealers' forge	10.00 to	10.50
Mixed borings	8.50 to	9.00
No. 1 busheling	12.25 to	12.75
No. 1 boilers, cut to sheets and rings	9.00 to	9.50
No. 1 railroad cast scrap	12.25 to	12.75
Stove plate and light cast scrap	10.00 to	10.50
Railroad malleable	12.00 to	12.50
Agricultural malleable	10.50 to	11.00
Pipes and flues	10.00 to	10.50
Railroad sheet and tank scrap	10.00 to	10.50
Railroad grate bars	9.50 to	10.00
Machine shop turnings	10.00 to	10.50
Bundled sheet scrap	10.00 to	10.25

A special bonus pay day, to be termed Christmas Bonus Day, is to be inaugurated on Dec. 24 by the Inland Steel Company, Indiana Harbor, Ind. All the employees are to participate in the extra distribution, provided their service with the company started on or before Dec. 1, 1914, and that they are in the employ of the company on Dec. 1, 1915. The bonus day is to be an annual affair and the sum is entirely voluntary, subject to the ruling of the company officers.

British Market Nominal

Exports of Hematite Iron and Scrap Prohibited—Maximum Prices for Iron

(*By Cable*)

LONDON, ENGLAND, Dec. 22, 1915.

Exports of hematite pig iron and iron and steel scrap have been prohibited, and definite announcement is pending regarding maximum prices for all pig iron. It is understood that No. 3 Cleveland iron will be held at 82s 6d, based on coke at 30s, and advancing 15d for every shilling advance in coke. Cleveland hematite iron is to be held at 122s 6d, as a maximum, based on coke at 28s and Rubio iron ore at 34s; coke scale same as for No. 3 Cleveland iron; ore scale, 2s advance for every shilling advance in ore. Coke is now 34s and Rubio iron ore 38s. It is proposed also to fix a maximum price for west coast hematite iron, Scotch foundry iron and Welsh hematite iron.

National demand for steel is increasing and works are permitted to sell only limited quantities, consequently all quotations are practically withdrawn. Welsh sheet bars have sold at £11 10s to £12 for January-March local delivery. Tin plates are firm at 24s 6d to 25s. Quotations, which are largely nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 24s. 6d. to 25s., against 24s. one week ago.

Cleveland pig-iron warrants, 76s. 6d., against 75s. 4½d. one week ago.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 76s. 9d., compared with 75s. 6d. one week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £17 nominal.

Steel ship plates, Scotch, delivered local yards, £11 5s.

Steel rails, export, f.o.b. works port, £11 5s.

Hematite pig iron, f.o.b. Tees, 130s. to 135s.

Sheet bars (Welsh), delivered at works in Swansea Valley, £11.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, nominal and unquotable, against £12 5s. three weeks ago.

Steel bars, export, f.o.b. Clyde, £15 5s.

Ferromanganese, f.o.b., £20 15s.

Ferrosilicon, 50 per cent, c.i.f., £27.

Growing Exports of Billets

Exports of billets, ingots and blooms are now at a greater monthly average than ever before. In July, the total was 14,480 gross tons; in August, 89,134 tons, and in September, 67,121 tons, or an average of 56,911 tons per month. To Oct. 1, 1915, the total exports were 407,901 tons or 45,322 tons per month, against a total of only 85,717 tons for the same nine months in 1913. The distribution of these exports for the first nine months of 1913 and 1915 is interesting:

	1913, Gross Tons	1915, Gross Tons
To the United Kingdom	50,923	310,236
Canada	34,646	34,733
Other countries	148	62,932

The increase in amounts sent to Great Britain and to other countries is noteworthy. The exports to Canada have remained stationary.

The railroad to an ice free port in northern Russia, from Petrograd to Ekaterinenhaven, or Catherine Harbor, first definitely announced in the United States through an illustrated article in THE IRON AGE, March 18, 1915, will, it is now expected, be running trains, at least for Government purposes, early in January. According to Commercial Attaché Henry D. Baker, writing from Petrograd on Nov. 15, the steamer Czar of the Russian-American Line, recently arrived at Kola, the northern terminus, at least for the time being, of this railroad line, and a short distance up the Kola River from Catherine Harbor. This ship, it is added, brought 500 workmen from the United States and Canada to rush the work on the railroad, together with a large cargo of rails, locomotives, flat cars, switches and other equipment. The difficulties in railroad construction have been very great.

Metal Market

NEW YORK, Dec. 22, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Dec.	Lake	Electrolytic	Tin New York	New York	St. Louis	New York	St. Louis
15	20.00	19.62½	37.75	5.40	5.30	17.50	17.25
16	20.00	19.75	39.25	5.40	5.30	17.50	17.25
17	20.00	19.87½	40.00	5.40	5.30	17.50	17.25
18	20.00	19.87½	.....	5.40	5.30	17.50	17.25
20	20.12½	20.12½	40.00	5.40	5.30	17.50	17.25
21	20.25	20.25	39.50	5.40	5.30	17.50	17.25

Under renewed buying copper has advanced. Tin is higher after a spurt of activity. Lead is firmly held at the recent advance. Spelter is quiet but prices are sustained. The antimony situation was relieved by recent arrivals but quotations are firm.

New York

Copper.—About the middle of last week renewed interest was shown in copper, and on Dec. 15 several good inquiries came out. Business was done at 19.87½c. and 20c., thirty days delivered. By Dec. 17 the market was firm at 20c., full terms, and since then it has gone to 20.25c., full terms, the quotation of yesterday for both Lake and electrolytic. The buying was almost entirely of electrolytic, although some Lake was sold also. Second-hand lots were absorbed on the rise. On Monday activity was again renewed and where the market stood at 20c. in the morning it went to 20.25c. with a rush about noon. Yesterday, with the market still at 20.25c., an inquiry for several million pounds for January, February and March delivery came out but was not placed so far as is known. Makers of munitions have been large buyers while a good demand has come also from the brass and wire mills. The exports this month have reached the excellent aggregate of 23,505 tons. Rumors are out of an inquiry for several thousand tons, delivery through 1916.

Tin.—A report from London that Great Britain intends to curtail shipments caused the market to become active and excited Dec. 16, and on that day between 400 and 500 tons was sold at prices ranging from 37.50c. to 39.50c. On the following day the market was not so active but nevertheless 250 tons was taken. Most of the business of the two days was confined to the larger consumers although the dealers took a hand in the buying also. The report from London has not been officially confirmed, but it is understood that the intention is to maintain stocks of about 4000 tons in England at all times to guard against delays in arrivals and interferences with them. This week the market has been dull, and some pressure has developed to sell spot, but buyers have refused to be tempted. The arrivals this month total 3605 tons and there is afloat 5478 tons.

Lead.—The trade has not yet recovered from the surprise occasioned by the advance to 5.40c., New York, made by the leading interest about a week ago. The higher price caused a few nervous domestic buyers to enter the market, but for the most part both buyers and sellers are proceeding slowly. The independents followed the advance of the leading interest and quotations yesterday were firm at 5.40c., New York, and 5.30c., St. Louis. If it were possible to get the metal, export sales could probably be made at 5.50c., New York. The exports this month total 5908 tons.

Spelter.—The market has changed but little. Inquiry has been rather light although some business has been done. It is asserted on all sides that prompt and nearby is scarce. The New York quotation yesterday was 17.50c. and that at St. Louis was 17.25c. For January delivery about 16.50c. is asked, for first quarter about 16c., while second quarter ranges from 13.50c. to 13.75c. Sellers have tried repeatedly to induce consumers to buy ahead. The exports continue heavy, amounting this month to 5661 tons.

Aluminum.—Metal 98 to 99 per cent pure is quoted at 56c. to 58c., with the market a trifle easier.

Antimony.—The recent arrival of several hundred tons from the Far East has made the market easier, though 39c., duty paid, continues the minimum quotation. Futures are quoted at 33.50c. to 34c., in bond.

Old Metals.—Conditions have not materially changed, the market continuing firm. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	18.00 to 18.50
Copper, heavy and wire	17.75 to 18.00
Copper, light and bottoms	16.00 to 16.50
Brass, heavy	12.50 to 13.00
Brass, light	11.00 to 11.50
Heavy machine composition	15.00 to 15.25
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	13.00 to 14.00
Lead, heavy	4.75
Lead, tea	4.50
Zinc	11.00 to 12.00

Chicago

DEC. 20.—The trend of prices in metals was uniformly upward the past week and the market exhibited decided evidences of strength in every direction. We quote: Casting copper, 19.50c.; Lake copper, 20.25c.; tin, carloads, 40½c.; small lots, 42½c.; lead, 5.32½c.; spelter, nominally, 17½c.; sheet zinc, nominally, 22c.; Cookson's antimony, 50c.; other grades, 42c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 16.25c.; copper bottoms, 15.25c.; copper clips, 15.50c.; red brass, 13.75c.; yellow brass, 12c.; lead pipe, 4.75c.; zinc, 14c.; pewter, No. 1, 24c.; tinfoil, 31c.; block tin pipe, 33c.

St. Louis

DEC. 20.—With a sharp movement upward in spelter, prices generally on non-ferrous metals are higher, the close to-day being quoted as follows: Tin, 43c.; Lake copper, 20½c.; electrolytic copper, 20¼c.; Asiatic antimony, 44c.; lead, 5.60c.; spelter, 20c. In the Joplin ore market zinc blende sold $15 per ton higher than a week ago, or at $85 to $105 for 60 per cent. The advance was one of the sharpest in the history of the district. Calamine sold at $65 to $75. Lead ore was $2 stronger, at $72 for 80 per cent. The average for the week on zinc blende was $89.65; calamine, $64.47; lead, $69.81. Miscellaneous scrap metals are quoted as follows: Light brass, 7.50c.; heavy yellow brass, 9.50c.; heavy red brass and light copper, 11c.; heavy copper and copper wire, 13c.; lead, 4c.; zinc, 7.50c.; pewter, 21c.; tinfoil, 30c.; tea lead, 3.50c.

For a Standard Wire and Sheet Gage

W. Hume Logan, president Dow Wire & Iron Works, Louisville, Ky., acting for the National Association of Ornamental Iron and Bronze Manufacturers, has taken up with the Bureau of Standards at Washington the question of having such legislation enacted by Congress as will create standard gages for wire and sheet metal, including steel, brass, copper, bronze and aluminum. Owing to the fact that a number of gages are in general use, much confusion is caused both to manufacturers using these products and to consumers. Sometimes losses are caused by the necessity of rejecting shipments of wire or sheets which are of the wrong gage.

S. W. Stratton, director of the Bureau, has expressed the opinion that a general agreement on the part of the trade would be better than a formal act of Congress; but Mr. Logan points out that it is impracticable to attempt this, as efforts along that line have been made without result for twenty years.

University of California Gets Exposition Mine Exhibits

A large number of the exhibits in the Palace of Mines have been donated to the University of California, where they will be made part of the College of Mining. Prof. C. E. Van Varneveld, who was chief of mining and metallurgy at the exposition, is now a docent at the University of California, and through his efforts and those of Prof. A. C. Larson of the department of geology the exhibits have been obtained. Among them are parts of the exhibit of the United States Bureau of Mines, of the Standard Oil Company, the United States Steel Corporation and the Anaconda Copper Company.

Iron and Industrial Stocks

NEW YORK, Dec. 22, 1915.

The stock market for the most part has been drifting, apparently awaiting the outcome of the submarine controversy with Austria-Hungary. Values have therefore changed but little except in the case of a few stocks influenced by special conditions. Among these Midvale Steel was conspicuous, recovering sharply from the downward movement which had been in progress for some time. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	30 - 32½	Ry. Steel Spring, com.	43½ - 46
Allis-Chal., pref..	82 - 83½	Republic, com. ..	53¼ - 56½
Am. Can, com...	58⅞ - 61½	Republic, pref...	110 - 110½
Am. Can, pref...	110¾ - 113¼	Sloss, com.	62¼ - 63½
Am. Car & Fdy., com.	75¾ - 81½	Sloss, pref.	101
Am. Car & Fdy., pref.	116 - 116½	Pipe, com.	23¼ - 25
Am. Loco., com..	67¾ - 70¼	Pipe, pref.	51 - 51⅛
Am. Loco., pref..	101 - 102	U. S. Steel, com..	84⅞ - 87
Am. Steel Fdries.	60½ - 62¼	U. S. Steel, pref...	116⅛ 116⅞
Bald. Loco., com.	113¼ - 120¾	Va. I. C. & Coke.	60 - 65
Bald. Loco., pref.	108½ - 109½	West. Electric...	67½ - 70¼
Beth. Steel, com.	465 - 482	Am. Rad., com...	385 - 387½
Beth. Steel, pref.	150	Am. Ship, com...	36½ - 37
Case (J.I.), pref.	85⅜	Am. Ship, pref...	81 - 84
Colorado Fuel ...	50¾ - 53⅛	Chic. Pneu. Tool.	76 - 78⅜
Deere & Co., pref.	95⅞ - 96⅝	Cambria Steel...	74¾ - 76¼
General Electric..	172 - 175½	Lake Sup. Corp..	9¼ - 9½
Gt. No. Ore Cert.	47¾ - 49½	Pa. Steel, pref.	80½
Int. Harv. of N. J., com.	110½ - 111½	Warwick	10¼ - 10⅝
Int. Harv. of N. J., pref.	117½	Cruc. Steel, com..	72 - 75¾
Int. Harv. Corp., com.	83	Cruc. Steel, pref..	110 - 111¾
Int. Harv. Corp., pref.	108	Harb.-Walk. Refrac., pref.	99½
Lackawanna Stl..	80 - 83⅞	La Belle Iron, com.	50½ - 52
N. Y. Air Brake.	135¼ - 140½	Am. Brit. Mfg., com.	21
Nat. En. & Stm., com.	28 - 29⅞	Can. Car & Fdy., com.	92 - 95
Nat. En. & Stm., pref.	94⅝	Can. Car & Fdy., pref.	105 - 108½
Pgh. Steel, pref..	97¾ - 98	Carbon Stl., com.	64 - 65
Pressed Stl., com.	63¼ - 65	Dom. Steel, com....	47
Pressed Stl., pref.	105	Driggs-Seabury ..	140 - 165
		Midvale Steel....	66¾ - 74

Dividends

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent and an extra dividend of 1½ per cent, payable Dec. 31.

The Standard Screw Company, regular simi-annual, 3 per cent and an extra dividend of 3 per cent on the common stock; regular semi-annual, 3 per cent on preferred A and 3½ per cent on preferred B stock, all payable Jan. 1.

The Sharon Steel Hoop Company, regular quarterly, 1¾ per cent, payable Dec. 24.

The Nova Scotia Steel & Coal Company, 12 per cent on the preferred stock, being an accumulative dividend of 10 per cent per annum to Sept. 30, 1915, and a quarterly dividend of 2 per cent for the quarter ended Dec. 31, 1915, both payable Dec. 30. The dividends on both the common and preferred stocks were passed in September, 1914.

The American La France Fire Engine Company, regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 3.

The Youngstown Sheet & Tube Company, regular quarterly, 2 per cent on the common and 1¾ per cent on the preferred stock, payable Jan. 1.

The Western Electric Company, $4 on the common and 73-100 of 1 per cent on the preferred stock, payable Dec. 31.

The Riehle Brothers Testing Machine Company, annual, 10 per cent.

The Garvin Machine Company, semi-annual, 3½ per cent on the preferred stock, payable Jan. 1.

The Washburn Wire Company, 2¼ per cent on the common and regular quarterly, 1¾ per cent on the preferred stock, payable Jan. 1.

The Brier Hill Steel Company, regular quarterly, 1¾ per cent, payable Jan. 1.

The Kokomo Steel & Wire Company, quarterly, 1½ per cent on the common stock, payable Jan. 1. The last dividend was paid in March, 1912.

The Standard Coupler Company, semi-annual, 4 per cent on the preferred and 1 per cent on the common stock, payable Dec. 24.

The E. W. Bliss Company, regular quarterly, 1¼ per cent and extra 11¼ per cent on the common and regular quarterly, 2 per cent, on the preferred stock, payable Dec. 24.

Officials of the Crane Company, Chicago, announce that the company's annual Christmas gift to its employees will consist this year of 10 per cent of the annual salary of each man or woman employed more than six months, totaling more than $700,000.

Lighter I-Beams of Standard Depth

The Carnegie Steel Company, Pittsburgh, Pa., has issued a pamphlet describing structural beams supplementary to but lighter than the American standard beam sections. It has been found desirable in many cases, especially in the construction of modern office buildings and buildings intended for light machine shop work, to use deeper beams than required for safe carrying capacity as determined by the floor loads required by the building laws of various cities. As a result the full strength of a standard beam section is not always necessary, and has brought about the manufacture of lighter sections of the standard depth. Previously, in the endeavor to meet this condition, designers have followed the outline of the American standard profiles which, in turn, were based on the original German normal profiles. Consequently lightweight sections have been made heretofore with the flanges of the same width and taper, but somewhat thinner, and also with thinner webs than the minimum weight American standard sections.

The beam sections illustrated in this pamphlet differ from the American standard profiles in width, slope and thickness of flanges. The 24 and 27 in. beams have a flange width of 9 in., as compared with the 7 in. of the American standard section, but the flange widths of the other sections follow the depths in a gradual sequence. The flange width of the 12-in. beam is 6 in., as compared with the 5 in. of the American standard beam. The slope of the flanges is uniformly 1 in 11.

These new sections have the advantage of somewhat greater lateral stiffness due to their greater width of flange and, while the carrying capacity of these lighter sections is theoretically somewhat less than the carrying capacities of the corresponding minimum weight standard sections, the claim is made that the metal has equal, if not greater, efficiency pound for pound.

There is no 20-in. beam in this new series, the beams 12 in. and over being graduated by intervals of 3 in. The pamphlet includes the usual tables of properties and safe loads.

Commercial Electrolytic Zinc

Electrolytic zinc is being produced at the rate of 10 tons per day by the Anaconda Copper Company at Great Falls, Mont., and it is reported that a large plant for this purpose is to be erected near hydroelectric power. The production of spelter by electricity has not been profitable heretofore, but several important factors favor this enterprise by the Anaconda company. The ore is also relatively high in silver, a large part of which is recoverable, and electric power there is cheap. The pure product also commands now a very high price, rivaling tin. As made by Brunner, Mond & Co., at Winnington, Eng., heretofore the only makers of electrolytic zinc, it is guaranteed 99.95 per cent zinc.

Electrolytic spelter is also now being made, several tons daily, by the Weedon Mining Company, at Welland, Ontario, and the Consolidated Mining & Smelting Company at Trial, B. C. The Bully Hill Copper Company in California may become a regular producer.

Invar metal, formerly not made in the United States commercially, is now obtainable from an American manufacturer, according to an announcement by the United States Coast and Geodetic Survey. It is an alloy of nickel and iron and valuable because of its very low coefficient of expansion, about 1-25 that of steel. Tapes of this metal for use in base measurement have been obtained from England as required.

W. M. Corse, secretary of the American Institute of Metals, announces the decision to hold the convention of the American Foundrymen's Association and American Institute of Metals at Cleveland in the week of Sept. 11, 1916; also the arrangement to hold the exhibition of foundry equipment and supplies under the auspices of the two associations in the Cleveland Coliseum.

Employment Managers' Conference at Industrial Educational Society Meeting

The National Society for the Promotion of Industrial Education will hold a meeting in Minneapolis, Minn., Jan. 20, 21 and 22, 1916. In connection with the meeting will also be held an employment managers' conference on Jan. 19 and 20. The program for this conference, of which Edgar J. Couper, president Minneapolis Civic and Commerce Association, is chairman, is as follows:

The Function of the Employment Department.

The Aim and Work of Employment Managers' Associations.

University Schools of Business and the Training of Employment Executives, by Dr. Harlow Stafford Person, director Amos Tuck School of Administration and Finance, Dartmouth College, N. H.

Problems and Experiences in Managing Employment Departments in Industry.

The Relation of the Labor Turn-Over to Profits.

Methods of Reducing the Labor Turn-Over. *a.* Physical Examination of Applicants as a Factor in Reducing the Labor Turn-Over. *b.* Apprenticeship as a Factor in Reducing the Labor Turn-Over.

A Decreasing Labor Turn-Over Through Industrial Education Developed on Trade Understandings, by Charles H. Winslow, United States Bureau of Labor Statistics, Washington.

What are the Proper Records to be Kept for a Scientific Analysis of the Turn-Over of Labor in a Given Plant.

How to Reduce Absenteeism.

Methods of Reducing Unemployment.

Of the general meeting mention may be made of some sectional meetings to be held on the afternoon of Jan. 21. One group will be devoted to industrial, vocational and trade preparatory schools; another to evening vocational schools; another to trade and technical schools, and another to industrial part-time and continuation schools. Arthur L. Williston, principal Wentworth Institute, Boston, is chairman of the group devoted to trade and technical schools.

For the industrial part-time and continuation schools meeting, R. L. Cooley of the Continuation School, Milwaukee, is chairman and the program is as follows:

Report of the Survey on Apprenticeship in Minneapolis, by Professor Gesell, University of Minnesota, Minneapolis.

Problems of Continuation Schools in Large Cities, by W. Stanwood Field, director evening and continuation schools, Boston, Mass.

A Description of the Wisconsin Continuation Schools, by Warren E. Hicks, supervisor industrial education, State of Wisconsin.

Possibilities for Continuation and Part-Time Schools for Miners, by Millard B. King, chief division of vocational schools, State Department of Public Instruction, Pennsylvania.

The sessions will be held at the Hotel Radisson. The secretary of the association is Alvin E. Dodd, 140 West Forty-second Street, New York City.

Small Imports of High-Speed Steel Alloys

The effect of the war on the importations into the United States of ferroalloys used in making high speed steel appears in the following tabulation of Government data, which gives the important alloys aside from ferrosilicon and ferromanganese:

	Third Quarter 1914, Gross Tons	Fourth Quarter 1914, Gross Tons	First Quarter 1915, Gross Tons	Second Quarter 1915, Gross Tons
Tungsten and the alloy..	16(67)	8(147)	2(71)	5
Chromium and the alloy.	75(52)	1(32)	5(103)	27
All other alloys used in steel except ferromanganese and silicon)...	16	63(90)	5(98)	..

The figures in parenthesis give the imports for the corresponding quarter of the previous year.

Imports of "ferroalloys except ferrosilicon" for the fiscal year ended June 30, 1915, are given as 291 tons as compared with 927 tons and 1293 tons for the same periods in 1914 and 1913 respectively. To Oct. 1, this year, these imports were only 44 tons, against 863 tons for the same nine months of 1913.

Tungsten, which was selling before the war at 60c. to 65c. per lb. of contained metal, is now from $6 to $8.50 per lb.

Larger Demand for Steel Castings in Germany

War conditions in Germany have made unusual demands on the steel casting industry of that country. The following comparative table of output of steel castings, compiled from a study of German official statistics, shows the expansion due to the war:

	Acid Steel Castings, Metric Tons	Basic Steel Castings, Metric Tons
First year of the war, Aug. 1, 1914, to Aug. 1, 1915	106,010	307,275
14 months of the war, Aug. 1, 1914, to Oct. 1, 1915	152,176	386,995
Rate per month for 14 months of the war	10,869	27,642
Production in 1913	109,329	253,587
Rate per month in 1913	9,110	21,132

Thus in acid steel castings the rate of 10.869 tons per month for 14 war months was greater than the record rate of 9110 tons per month in 1913. In basic steel castings the increase was even more pronounced—from 21,132 tons to 27,642 tons per month. The excessive demand for castings for ordnance work is probably the explanation of these unusual increases. For comparison, the production of basic open-hearth steel castings in the United States in 1913 was 460,161 gross tons or 38,347 tons per month, and of acid open-hearth castings, 450,055 tons, or 37,504 tons per month.

Link-Belt Officials Form Electric Steel Company

The Electric Steel Company, Chicago, recently organized with Charles Piez, president of the Link-Belt Company, president; P. L. Coonley, vice-president of the Link-Belt Company, secretary and treasurer, and John M. Olmsted, vice-president and general manager, has taken over a plant at Thirty-first and Wood Streets and has contracted for the installation of a Snyder electric furnace, with the expectation of being able very promptly to produce steel castings. The company contemplates limiting itself to small castings of superior quality, especially alloy steel castings. The experience of the operators and the connections of the company promise unusual advantages with respect to the heat treatment of steel, and the new organization expects to occupy a special position in supplying work to meet exacting requirements. The Electric Steel Company, though not the first to operate an electric furnace for the manufacture of steel castings in Chicago, is now the only such foundry in that city. It is the expectation that deliveries will be possible soon after Feb. 15.

Railroad Car Business

Car buying since last week's statement in this column embraces the following: 350 coal cars for the New York, Ontario & Western, placed with the Cambria Steel Company, and possibly 100 gondolas for the same road placed with the American Car & Foundry Company. The New York Central has bought 105 passenger equipment cars as follows: 45 of the Standard Steel Car Company, 45 of the American Car & Foundry Company and 15 of the Barney & Smith Car Company. It is understood that the New Haven has placed 500 hopper cars with the Standard Steel Car Company. The American Car & Foundry Company will build 50 tank cars for the Prudential Oil Corporation and some 50 cars for the New York, Philadelphia & Norfolk. Statements of sales of 100 more passenger equipment cars for the Pennsylvania are as follows: American Car & Foundry Company, 26; Harlan & Hollingsworth Corporation, 47; and J. G. Brill Company, 28.

Imports of antimony as matte, regulus or metal have largely increased in recent months. For the third quarter of the year they were 5,421,043 lb. against 2,964,960 lb. in the third quarter of 1914. To Sept. 30 they were 13,420,157 lb., against 10,065,936 lb. The price has shown no signs of declining, in spite of the nearly doubled shipments of the third quarter.

New Electrolytic Method of Producing Pure Iron

Announcement is made from the University of Illinois of the discovery of a new process for the production of iron of great purity and unique magnetic properties. The discovery was made in the course of investigations by Dr. Trygve Yensen of the university engineering experiment station into the magnetic properties of iron and iron alloys. The process consists in melting electrically refined iron in a vacuum, reducing the impurities to a heretofore unapproached minimum. The permeability of the metal thus produced is reported to be 20,000. An alloy of this product with silicon is said to have a permeability of about 50,000, and the energy necessary to reverse the magnetism of this alloy is but one-fifth to one-twentieth of that required for iron manufactured commercially. Metal produced by Dr. Yensen's method will have its principal application in the construction of electrical machinery.

Pittsburgh and Nearby Districts

The Driggs-Seabury Ordnance Company, Sharon, Pa., is reported to have taken a contract to manufacture for the British Government 1000 aeroplane guns, 500 large cannons and a great quantity of 6-in. high-explosive shells. Of the $6,500,000 new stock issued by this company 54,250 shares have been offered to stockholders at $125. President A. E. Borie, in a circular letter to the stockholders, states that the profits of the Driggs-Seabury Ordnance Company and the Savage Arms Company, recently acquired, from war orders alone are conservatively estimated at $6,500,000 for 1916.

The Carnegie Steel Company has bought more ground adjacent to its steel works at Clairton, Pa., which will likely be used later for plant additions.

This week the American Sheet & Tin Plate Company, Pittsburgh, is expected to close for eleven electric cranes for its new tin-plate plant at Gary, Ind.

The Cambria Steel Company, Johnstown, Pa., and the Ford Steel Wheel Company, Butler, Pa., are both reported to be in the market for a number of steam hammers and other equipment.

The Niles Car & Mfg. Company, Niles, Ohio, which heretofore has built interurban trolley cars, will also go into the manufacture of motor trucks. A separate department will be created, and the company will be in the market for equipment.

The new plant of the Knox Pressed & Welded Steel Company at Sharon, Pa., is now operating double turn, with orders ahead for some months.

The Seaman-Sleeth Company, Pittsburgh, is increasing its capacity for the manufacture of steel rolls and is also erecting a new office building.

It is reported that a plant to roll seamless steel tubes will be located at Tiltonville, near Wheeling, W. Va., by the American Seamless Tube Company, recently organized with a Pennsylvania charter. Pittsburgh capitalists are stated to be identified with the project.

The steel mills and other manufacturing plants in the Pittsburgh and Valley districts are so rushed with orders that the holiday shut-down this year will be confined to Christmas only. Usually manufacturing plants devote from three days to a week at the holidays to taking inventory and making repairs, but that will not be done this year.

Merger negotiations will not interfere with the building of the fifth blast furnace by the Youngstown Sheet & Tube Company, which will be erected at East Youngstown, Ohio, where the other four stacks are located. President J. A. Campbell states that the furnace is not only badly needed now but more so on account of the increased demand for pig iron that will come as soon as the three open-hearth furnaces now under way have been completed. In times of pressure for material the company has always been a heavy buyer of pig iron. It is credited with buying this year about 250,000 tons.

The Lima Steel Casting Company, Lima, Ohio, will increase its capital stock from $50,000 to $100,000 and intends to make some improvements to its plant.

It is stated that among the additions to be made to the American Steel & Wire Company's plant at Donora, Pa., is a rod mill that will increase the capacity for making rods about one-third. It is expected to be ready for operation in about four months.

The Pittsburgh Model Engine Company, with works at Homewood Station, Pittsburgh, has increased its capital from $750,000 to $1,500,000. The additional stock has been purchased at par for cash by the Standard Steel Car Company, Pittsburgh. It is understood that the purchaser will use the plant for the manufacture of small gas engines and probably automobile parts.

Seeking a Broader Machinery Market

The incorporation of the National Transit Pump & Machine Company, Oil City, Pa., with a capital stock of $2,545,000, was mentioned in THE IRON AGE of Dec. 2. Authentic advices state that it represents what has heretofore been known as the National Transit Company, Department of Machinery. Practically all the stock is held by the National Transit Company and the officers of the parent company continue in their various capacities in the management of the subsidiary. For thirty-four years this department of the National Transit Company has been engaged in the manufacture of engines and pumping machinery to supply the great demands of the Standard Oil Company and its old subsidiaries.

The extensive plant at Oil City has recently been greatly enlarged, and, with its added facilities, the company is now seeking a broader market for its products, which include gas and oil engines, Diesel engines of the latest type, compressors, pumping machinery and pipe line supplies and fittings. The plant is now running at full capacity with two shifts.

New England Westinghouse Strike

The River and Hill plants of the New England Westinghouse Company, Chicopee Falls, Mass., have been affected by a strike of machinists and toolmakers. It is reported that about 500 employees walked out Dec. 18. The trouble started over the discharge of a union shop steward. The strikers have demanded, among other stipulations, union recognition, a minimum wage of 50c. an hour for toolmakers, 60c. an hour for gage makers, and 45c. an hour for machinists. The real issue seems to be union recognition, and on this point the company shows no disposition to give in.

In the few places remaining where strikes are still in force, little change is reported. The concerns affected claim to be slowly filling their shops and approaching normal conditions.

Eastern Pig Iron Association

R. H. Sweetser, president of the Thomas Iron Company, Easton, Pa., was elected president of the Eastern Pig Iron Association at its December meeting in Philadelphia—an honor well bestowed. Recently the association has had up for consideration a number of questions particularly interesting to operating men, and at the last meeting a number of such representatives of various companies were present. The questions discussed were "The Sampling and Analysis of Magnetic Iron Ore," "Size and Shape of Blast Furnaces." and "Volume of Blast Blown per Square Foot of Hearth Area."

The Farrell-Cheek Steel Foundry Company, Sandusky, Ohio, has placed contracts for the buildings and most of the equipment necessary to double its present output, giving it a capacity of 800 tons per month. It has also purchased a tract of land adjoining its present factory site for further extensions, the plans for which are now being prepared.

PROBLEMS FOR TOOL BUILDERS

Export Statistics Analyzed—From Whom Will Nations Buy After the War?

Following a study of figures bearing on machine-tool exports and of present conditions as they may effect such exports in the future, George R. Woods, manager of the New York office of the Allied Machinery Company of America, has evolved several question to which builders of machine tools should give consideration. Mr. Woods' presentation of the subject, which has been prepared in pamphlet form for distribution among manufacturers of tools, follows:

Europe is our best export market for machine tools, the volume of business jumping from $4,800,000 in 1910 to $12,260,000 in 1913. The grand total of our machine-tool exports throughout the world in 1913 amounted to $16,100,000, this being 5.35 per cent of the total of our iron and steel exports. For the year 1915 (December estimated) our machine-tool exports will total about $39,000,000, this being 13.33 per cent of our iron and steel exports in 1913 and equal to our total exports of agricultural implements for that year. It may be of interest also to note that our machine-tool exports this year will exceed our automobile exports in 1913 and come within $13,000,000 of equaling the exports of cotton manufactures in 1913.

To show the relative importance of export fields, reference should be made to the following table showing the consumption of machine tools in 1913 by continents. This table also shows the business done by Germany in the same territory and in the same period.

Exports of Machine Tools in 1913 by Germany and the United States

	United States	Germany
Europe	$12,268,677	$17,992,539
North America	2,554,420	453,568
South America	571,919	842,457
Asia	202,620	364,903
Australia	460,825	54,978
Africa	37,031	.....
	$16,095,492	$19,708,445

WAR DEMAND HAS GOVERNED EXPORTS

Before analyzing the European market, which is of most importance, brief comment should be made on the situation elsewhere. Before the war Germany led the United States in South America and in Asia, but notwithstanding the appeals made by industries in that territory during the war no special effort has been made by American manufacturers to intrench themselves in these German fields because of the enormous volume of our European business. Consequently, the conclusion of the war will not find the American machine-tool industry in any better position in Asia or in South America. Inquiries from China, Japan and Argentina are being ignored to-day because no deliveries can be made, Europe taking practically all machine tools being exported at this time. If American machine-tool builders continue to make themselves dependent on Europe for their export business, it is expedient, to say the least, that a careful study be made of that field and reference is invited to the following table, which gives an analysis of the European market by countries. This table also shows the volume of business done by Germany during the same period.

Exports of Metal-Working Machinery to Europe in 1913

	From Germany	From United States
Austria-Hungary	$3,047,775	$600,593
Belgium	1,798,104	786,679
Bulgaria	23,177	13
Denmark	288,634	84,753
Finland	66,420	24,947
France	3,208,936	1,936,908
Germany	.....	3,175,188
Greece	.....	2,310
Italy	1,545,043	437,910
Netherlands	981,249	260,893
Norway	192,962	79,366
Portugal	61,715	1,391
Roumania	143,374	110
Russia in Europe	3,524,251	1,088,751
Spain	405,687	109,624
Sweden	462,731	241,373
Switzerland	698,274	17,108
Turkey in Europe	37,460	3,105
United Kingdom	1,486,582	3,417,655
	$17,972,374	$12,268,677

FUTURE EFFECT OF WAR ON BUYING

Many questions assert themselves upon studying this table, for instance:

1. Assuming that the Central Powers are prejudiced against American machine tools, will Germany be able to supply the $3,700,000 worth of machine tools which she and Austria-Hungary purchased in America in 1913?

2. Assuming that Germany attempts to regain her position in Russia, will she find the United States prepared to diminish the annual business of $3,500,000 which Germany did there before the war?

3. Will the United States be prepared to get any part of Germany's share of Belgium's machine-tool business which, in 1913, amounted to $1,800,000?

4. Assuming that the Central Powers, which purchased $3,700,000 worth of American machine tools in 1913, are not prejudiced against the United States, will we be able to take care of Germany and Austria-Hungary as well as other nations who will all probably want more machines than heretofore?

5. Considering that Swtizerland, because of the war, has not been able to make her annual purchases, amounting to about $1,000,000 worth of machine tools, will Americans be prepared for the sudden and heavy demand from that country?

CURRENT STATISTICS MERIT CONSIDERATION

In conclusion mention is made of the fundamental economic changes which are taking place to-day. No manufacturer can afford to wait for the next census of 1920 to ascertain the condition of our commercial growth, for the moving finger of the statistician is daily recording significant facts which merit the earnest consideration of every machine-tool builder.

One fact which demands attention is that this country is becoming a manufacturing nation. In 1914 our exports of foodstuffs were 18 per cent as against 44 per cent in 1894, and our manufacturing products were 47 per cent of our exports in 1914 as against 23 per cent in 1894. Many other figures are available showing the growth of this country as a manufacturing nation, and having reached such a period it is necessary for us to study intensively our foreign markets and prepare to obtain that amount of export business which is indispensable to our prosperity.

National-Acme and Windsor Machine Company Merger

The proposed merger of a number of machine-tool and munition plants by the R. B. Phillips interests, which was announced about a month ago, has fallen through and in its place other negotiations are now under way, that if carried out will result in the combination of the National-Acme Mfg. Company, Cleveland, Ohio, and the Windsor Machine Company, Windsor, Vt., both makers of automatic screw machines. The original plan of the R. B. Phillips associated interests was to take over a number of plants to be controlled by a holding company known as the Phillips Corporation. The companies to be joined in this concern, according to announcements made at that time, were the American Steam Gauge & Valve Company, Boston; R. B. Phillips Company, Worcester and Lowell, Mass.; the Windsor Machine Company and the National-Acme Mfg. Company and the New England Steel & Ordnance Company.

Options recently held by Phillips interests have been allowed to expire, and the negotiations that are now under way have in view the purchase of the Windsor Machine Company by the National-Acme Mfg. Company. The National-Acme Mfg. Company has sent out notices to its stockholders of a prospective stock increase from $2,500,000 to $9,000,000. If the plans are carried out the company will have a capitalization consisting of $1,500,000 6 per cent preferred stock and $7,500,000 common stock.

The Pittsburgh Steamship Company has ordered from the American Shipbuilding Co. another 600-ft. ore boat, making three of that size ordered for 1916 delivery.

Machinery Markets and News of the Works

EXPORT SHIPPING DELAYED

Inland Firms Feel Freight Congestion

Spread of Domestic Purchasing a Strong Feature of Present Situation—Canada Busier Than Ever with Shells

Builders of machinery in the interior are feeling the effects of the freight congestion at Atlantic ports, to which shipments will be heavy for some months to come. The Chicago trade regards the situation as very serious, and in Cleveland it is expected that it will grow worse.

The domestic demand for machine tools is steadily improving, and would be better were it not for the long deliveries, which must be specified. The foreign demand appears to be on the wane, although there still is a large amount of buying, especially for export to Russia. Domestic buying is by far the most important feature at New York, where the trade is greatly encouraged by the diversity of interests now in the market.

New England is busier than ever, but worried over a possible shortage of coal due to an embargo placed on its transportation where lighterage is involved in New York harbor. Consumers of pig iron are similarly affected.

The aggregate of business in Cleveland is somewhat lighter, probably because of a falling off in the demand for round lots of machines, though the domestic demand for small lots is good. The New York Central Railroad is inquiring for a few machines. Dealers in Cincinnati report business to be good, but restricted by deliveries. The John Steptoe Shaper Company, Cincinnati, has prepared plans for an extension, 65 x 85 ft., two stories in height. The Indianapolis Drop Forging Company is erecting an addition to its shop which will require several heavy machines.

In Milwaukee the domestic demand is overshadowing that from abroad, and no holiday lay-offs are at all likely. It is reported from Sheboygan, Wis., that several metal shops have declined orders for munitions and also to sell their machine-tool equipment.

New export business has fallen off sharply in Chicago, but there continues an active demand from Canada for second-hand equipment, while the domestic demand grows steadily. Among other items of interest is one that the La Salle Machine & Tool Company, La Salle, Ill., has taken over the American twist drill grinders of the Heald Machine Company, Worcester, Mass. The Amalgamated Machinery Corporation, incorporated in New York a few months ago, has established a factory at Chicago for the manufacture of munitions. The Bates Machine Company, Joliet, Ill., will rearrange and add to its equipment to triple its capacity.

In Birmingham and contiguous territory, gasoline engines, woodworking machinery, ice plants and fertilizer equipment are active. In St. Louis demand is broadening into industrial fields remote from war business, and because of the scarcity of new tools, second-hand machines are taken up eagerly.

High prices and long deliveries continue to restrict operations in machinery on the Pacific coast, although in the Northwest demand is heavy for cars, trucks and other mill supplies required by the lumber and logging companies. The Idaho National Harvester Company, Moscow, Idaho, is reported to have received an order for war munitions.

Operations for the output of shells continue lively in Canada. Large orders are placed steadily by the government, necessitating the installation of much new equipment. Plants are being reorganized, old ones taken over, and a general state of activity prevails.

New York

NEW YORK, Dec. 22, 1915.

The trade is greatly encouraged by the rapidly growing volume of inquiries and orders from diversified domestic industries which are not dismayed by the far-off deliveries. A ball bearing company, for instance, has ordered several thousand dollars worth of machinery on which deliveries will not be made until next July. Makers of automobiles, automobile accessories and innumerable other products are in the market. Inquiries have come from paper mills and, to some extent, from the railroads.

The Delaware, Lackawanna & Western Railroad has issued a small list, and at least one other road has made tentative inquiry. The Bijur Motor Lighting Company, Hoboken, has bought tools worth several thousands of dollars and needs still more. The company has been remarkably successful in the past few years and has seldom been long out of the market. The Remington Arms & Ammunition Company, Bridgeport, is equipping a plant it recently leased in a new terminal building in Hoboken, N. J.

So far as the war demand goes, the peak seems to have been reached, although this opinion has been held before and found to be erroneous. Some of the makers of single-purpose lathes and others whose venture into the lathe business is of recent date are now looking for orders with greater energy than they have heretofore displayed. A few of the smaller and less known makers of standard engine lathes are beginning to catch up on deliveries and now can make them in three or four months, a situation partly attributable to their having sublet the making of parts for their machines. Automatic screw machines are more than ever difficult to obtain, deliveries on some sizes running into March and April of 1917.

Russian buyers continue active, and shipments are proceeding steadily. In some cases the instructions are to send by way of Archangel, for which port a steamer left this week. The general understanding is that this port will soon be icebound. Foreign buying is not nearly as active as it was, and probably will continue to diminish, in view of Great Britain's partial prohibition of imports. It will require a little time for the trade to adjust itself to the new regulations.

Numerous reports are current as to new shell orders which it is declared war material agencies are endeavoring to place, but these are unconfirmed. It is said that one inquiry calls for 500,000 18-lb. shells for England, also that France and Russia are in the market for 15,000,000 shells of various sizes. Spain is reported to have inquired for 300,000 high explosive shells.

The Rome Metallic Bedstead Company, Rome, N. Y., has leased from the Degnon Realty & Terminal Company a site 100 x 330 ft. on Anable Street, Long Island City, on which it will erect a four-story concrete and steel factory to contain about 110,000 sq. ft. of floor space. A. F. Carpenter is treasurer.

Battelle & Renwick, 30 Maiden Lane, New York, manufacturers of chemicals, are having plans drawn by William A. Tilton for a four-story brick factory, 50 x 100 ft., to be erected on the north side of Essex Street near Hudson Street, Jersey City, at an estimated cost of $29,575.

The J. Cutler Iron Works, 122 Newton Street, Brooklyn, N. Y., manufacturer of structural and ornamental iron, has increased its capital stock to $4,200.

The Nelson & Landgren Iron Works, 1220 Sixtieth Street, Brooklyn, N. Y., has had plans drawn for a one-story brick shop, 40 x 80 ft., to cost about $3,500.

The La Cour Iron Works, Borden Avenue, Long Island City, N. Y., has had plans drawn by E. Worm, Twenty-sixth and State streets, Flushing, L. I., for a one-story frame factory, 44 x 140 ft., to cost about $3,000.

The General Abrasive Company, Niagara Falls, N. Y., expects to have its new plant ready for operation by Jan. 15. Its product is an artificial abrasive known as oxalite. The company also imports Greek and Turkish emery for its manufacturing operations. F. D. Hamilton is president of the company; C. L. Barlow, vice-president; H. A. Richmond, treasurer, and T. B. Allen, secretary.

The T. H. Symington Company, manufacturer of railroad specialties, Rochester, N. Y., has let contract for a one-story factory addition to cost $25,000.

The General Railway Signal Company, Rochester, N. Y., has received orders for 50,000 rough shell forgings.

The Militaire Autocycle Company of America, Buffalo, recently incorporated with a capital stock of $250,000, has secured the plant at Clyde Street and the Lackawanna Railroad, formerly occupied by the Buffalo Coated Paper Company, having a floorspace of 35,000 sq. ft., and is equipping it for the manufacture of autocycles, an automobile for military and other uses. N. R. Sinclair, formerly of Toronto, owner of the patent under which the new autocycle is to be manufactured, is president.

The Simplex Magneto Company, Millbrook, N. Y., has taken out incorporation papers, with an authorized capital stock of $50,000, to manufacture magneto parts, appliances for motors, etc. A plant is being established. L. L. Lowry, 317 West Ninety-third Street; W. J. Goldsmith, 652 West End Avenue, New York City, and C. Messerschmidt, 1411 Bedford Avenue, Brooklyn, are the incorporators.

The Rochester Top Lift Company, Rochester, N. Y., has commenced work on a two-story factory, 51 x 207 ft., with two wings, which it will erect at 348-360 Whitney Street at a cost of $50,000.

The Federal Bearings Company, Poughkeepsie, N. Y., has been incorporated by H. A., G. H. and J. W. Schatz of that city, with an authorized capital stock of $1,000,000, to manufacture special bearings, machinery, tools and supplies.

The Blackman Talking Machine Company, Hornell, N. Y., has secured incorporation papers, with an authorized capitalization of $200,000, and will engage in the manufacture of talking-machines, records and accessories. The incorporators are J. F. Ashby, 962 Forest Avenue; F. P. Oliver, 470 Westminster Road, Brooklyn, and J. N. Blackman, East Orange, N. J.

The Delaware, Lackawanna & Western Railroad, Hoboken, N. J., has completed plans for a powerhouse, 30 x 85 ft., one story, 30 ft. high, with 80-ft. stack, to be erected at its new passenger terminal at Buffalo.

The American Radiator Company, Buffalo, is taking bids for an addition to its plant at Elmwood Avenue and the New York Central Railroad Belt line.

The Brockway Motor Truck Company, Corning, N. Y., is taking bids for its factory, which will be 40 x 186 ft., two stories.

The Saltite Company, Bronx, N. Y., has been incorporated with a capitalization of $50,000 to manufacture locks, washers, etc. C. M. and S. J. Young, 334 West Fifty-eighth Street, New York City, and J. M. Butler, Westchester, are the incorporators.

The De Witt-Boag Company, Hornell, N. Y., has let contracts for factory, 50 x 80 ft., of reinforced concrete.

The Salisbury Ball Bearing Corporation, Jamestown, N. Y., has filed articles of incorporation with a capital stock of $300,000 to manufacture ball bearings, machinery parts, appliances, etc., and will equip a manufacturing plant. C. W. Salisbury, J. W. Eckman and T. Linderholm, Jamestown, are the incorporators.

The Buffalo Pattern Works, Buffalo, will build a two-story factory, 70 x 120 ft., of brick and steel, on Hertel Avenue, near Elmwood Avenue, at a cost of $25,000. E. Simons, 13 Perry Street, is manager.

The Paull & Madley Company, Saratoga Springs, N. Y., has been incorporated with a capital stock of $100,000 to operate foundry and machine shops, etc. A. R. Paull and A. E. G. Madley, Montreal, Que., and C. K. Butler, Saratoga Springs, are the incorporators.

The Globe Device Company, Inc., Brooklyn, N. Y., has been incorporated with a capital stock of $100,000 to manufacture motors and appliances for automobiles. The incorporators are G. Hassell, 1172 East Thirty-seventh Street; M. J. Twomey and M. J. Hansen, 742 Lincoln Road, Brooklyn.

The General Electric Company, Schenectady, N. Y., has commenced work on a factory addition, 60 x 208 ft., one story, to cost $25,000. C. F. Hulth is superintendent of buildings.

The Genesee Tractor Company, Hilton, N. Y., has filed articles of incorporation and will establish a plant for the manufacture of tractors and special machinery. Its capital stock is $100,000. The incorporators are R. Tait, I. H. Walker and G. Y. Webster, Wilder Building, Rochester.

The Rochester Motors Company, Rochester, N. Y., has let contracts for the erection of a factory on Wren Street, 62 x 150 ft., one story.

The Globe Silo Company, Sidney, N. Y., has been incorporated with $25,000 capital stock to manufacture silos, ensilage cutters and blowers, farm machinery, etc. R. W. Siver, Sidney, N. Y.; J. M. Moore and F. E. Hunt, Unadilla, N. Y., are the incorporators.

Philadelphia

PHILADELPHIA, PA., Dec. 20, 1915.

The Keystone Supply & Mfg. Company, 917 North Ninth Street, Philadelphia, Pa., has had plans drawn for a one-story brick and concrete crane shed and pipe storage building, 62 x 100 ft.

The Edwin H. Fitler Company, 23 North Water Street, Philadelphia, Pa., cordage manufacturer, has awarded contract to Charles A. Collier, 1370 Gillingham Street, for a one-story brick boilerhouse to be erected in Bridesburg at a cost of about $2,500. It will be 27 x 43 ft.

The Abrasive Material Company, Bridesburg, Philadelphia, Pa., is having plans prepared for factory building to give about 50,000 sq. ft. of floor space. L. T. Byers is general manager.

The Thurlow Steel Company, Chester, Pa., plans improvements to its plant to cost about $300,000. Two small buildings are now under construction, and the contract for an addition to the main machine shop, 160 x 189 ft., will be let at once.

The Pintsch Compressing Company, 303 South Thirtieth Street, Philadelphia, Pa., has awarded contract to Walker Diamond, 2048 East York Street, for a factory building to cost $980.

Mrs. Eleanor Whitman, Philadelphia, Pa., has had plans prepared for a hydroelectric plant near Walnut Grove, Ariz., in connection with an irrigation project. Fred Dennett, Phoenix, Ariz., is in charge.

Catalogs Wanted

The O'Brien Machinery Company, 107 North Third Street, Philadelphia, Pa., has been formed by Frank L. O'Brien and Clarence J. O'Brien, both formerly with Frank Toomey, Inc., 127 North Third Street, Philadelphia. The O'Brien Company will handle a general line of machinery, electrical equipment, supplies, etc. It desires catalogs, price lists and jobbers' discounts on these goods from manufacturers who are not represented in their territory.

New England

BOSTON, MASS., Dec. 20, 1915.

Indignation is felt by New England manufacturers against the proposed changes in freight rate classification which will put a higher rate on various commodities between Southern points and points in New England between New York and Boston. The Boston Chamber of Commerce and other commercial bodies throughout New England have petitioned the Interstate Commerce Commission to suspend the enforcement of the order, which is to go into effect Jan. 1, as the manufacturers are prepared to prove that the "Boston Classification," as it is called, is an unjust discrimination against New England industry.

Many cities in New England are fearing a coal famine as the blizzard, the shortage in cars, and labor shortage and troubles at the mines, are combining already to bring some factories close to the point where they must close down for lack of coal. The busy Connecticut cities are especially threatened. The embargo just placed on coal shipped to Port Reading, N. J., by the Philadelphia & Reading Railroad and on shipments through New York by the Pennsylvania Railroad makes the situation more serious. It is reported that the Reading embargo will shut off from 300 to 400 cars a day, approximately 150,000 tons, destined for New England.

The Saco-Lowell Shops, Newton, Mass., are erecting an addition to be used for a foundry.

The Scovill Mfg. Company has announced the payment of a bonus of 10 per cent, based on annual salary, to all of its salaried employees. The wages of piece and day workers were advanced 10 per cent some time ago.

The Robertson Bleachery, New Milford, Conn., is to erect a plant costing about $800,000, including an electric pumping station.

The Derby Silver Company, Shelton, Conn., has posted a notice that, beginning Jan. 1, the employees will work a 55-hr. week with 60-hr. pay with an increase of 10 per cent in wages. The previous schedule was 59 hr. a week.

The Griffin Wheel Company, Chelsea, Mass., will build an addition to be used as a cleaning room.

The Remington Arms & Ammunition Company, Bridgeport, Conn., has secured a permit for the erection of a four-story brick factory on the north side of Barnum Avenue.

The Jewell Belting Company, Hartford, Conn., has leased the old building of the Southern New England Telephone Company and will occupy a portion of it to increase its manufacturing facilities. The company is reported to be busy on war orders for scabbards, holsters and belts.

It is reported that the Hortonia Power Company, Rutland, Vt., is planning an important hydroelectric development, and contracts are to be awarded for iron penstocks, waterwheels and generators.

The Norton Company has let a contract for a machine and carpenter shop, 80 x 259 ft., two stories, with a headhouse 60 x 80 ft., five stories.

The Bilodeau Ball Bearing Works, Boston, Mass., has been organized with an authorized capital of $10,000. Henry L. Bilodeau is president and treasurer.

The Continental Metals Company, Providence, R. I., has been incorporated with an authorized capital of $50,000, to deal in metals. The incorporators are John S. Murdock, John A. Tillinghast and B. M. Pinney.

Baltimore

BALTIMORE, MD., Dec. 20, 1915.

The Baltimore Drydock & Shipbuilding Company, Baltimore, Holden A. Evans, general manager, has received a contract for four motor-propelled ships of 3500 tons each from Cristopher Hennebig, Norway. The shipyard is rushed with business.

The Somerset Heights Water & Power Company, Somerset, Md., contemplates installing an electric motor and pump.

The new acid plant of the Standard Guano Company, Curtis Bay, Md., will cost about $300,000.

Emory L. Stinchcomb has been appointed receiver for the Rittenhouse-Fleury Company, 316 North Howard Street, Baltimore, engaged in manufacturing and repairing machinery, tools, etc.

With capital stock of $10,000, the Hopewell Electrical Supply Company, Hopewell, Va., has been incorporated. M. A. Finn is president.

Chicago

CHICAGO, Dec. 20, 1915.

The congestion of shipments at Atlantic seaboard points and all along the lines of the Eastern railroads is the occasion of no small disturbance of the arrangements of Western machinery interests for the delivery of their export orders. This condition is perhaps the important consideration at present. New business for export has fallen off quite sharply, although there continues an active demand for second-hand equipment for delivery in Canada. Domestic demand, which includes the buying of quite a number of individual machines by the railroads on miscellaneous orders, is steadily increasing. For the time being, however, there appears to be a slackening in the amount of plant extension, which for a while was so general. This is traceable in part to the inability of plant operators to secure the necessary cranes and power equipment, except upon much delayed deliveries; a resumption of building may be expected later in renewed volume. The general activity in second-hand tools is unabated.

The P. V. Snow Foundry Company, which has been operating at South Chicago and Greenwood avenues, Chicago, has filed articles of incorporation with a capital of $16,000.

The American Ever-Ready Works, 1238 South Michigan Avenue, Chicago, has had plans prepared for a four-story superstructure in connection with its plant at Thirty-seventh Street and Ashland Avenue.

The Wilson & Bennet Mfg. Company, Clearing, Ill., manufacturer of tanks, has purchased property adjoining its present factory on which it is building a two-story addition, 100 x 200 ft., to cost $50,000.

The General Chemical Company, 122d Street and the Calumet River, South Chicago, is building six one-story steel frame buildings to be used in the manufacture of sulphuric acid. The extensions will cost about $100,000.

The Amalgamated Machinery Corporation, Edison Building, Chicago, recently incorporated in New York, has established a factory at South Racine and Thirty-seventh streets, Chicago, which it constructed for the manufacture of ammunition machinery. This machinery is also being produced in several other plants near Chicago. G. B. Barrage is president; M. S. Rosenwald, vice-president; R. C. Schaffner is secretary and treasurer. These officers with B. V. Becker of Levinson, Becker, Cleveland & Schwartz, Chicago, and B. F. Yoakum, New York City, are the directors.

The Geneva Foundry & Machine Company, Geneva, Ill., advises that the addition to its foundry is to be 55 x 100 ft., and that practically all the equipment required has been contracted for.

The Galesburg Coulter-Disc Company, Galesburg, Ill., whose plant was recently destroyed by fire, has inclosed its old building temporarily and is again in operation. A new brick and steel warehouse has been completed, and contract for the steel work for a new factory is now being placed. The company has purchased the entire machinery and equipment of the Kingman Plow Company, Peoria.

The Bates Machine Company, Joliet, Ill., announces that it is not to do any building, as announced in a recent issue, but that it is making numerous improvements and putting in different equipment, by which it will be able to triple its capacity.

Curtis Brothers & Co., Clinton, Iowa, have completed arrangements providing for a wood-working plant, 100 x 236 ft., four stories, estimated to cost $150,000.

The Interstate Engine & Tractor Company, Waterloo, Iowa, is rebuilding the plant of the Kelley Mfg. Company, recently destroyed by fire, which it will occupy for the manufacture of tractor engines.

The Creapo Mfg. Company, St. Paul, Minn., builder of machinery, has been organized with a capital of $50,000 by C. A. Creapo, William Matheus and H. E. Angier.

The capital stock of the recently incorporated Lead Coating Mfg. Company, St. Paul, Minn., is $50,000. The company is erecting an initial building, 40 x 75 ft., which will be enlarged to meet the needs of its business.

The La Salle Machine & Tool Company, La Salle, Ill., has taken over the manufacture of the American twist drill grinders, formerly manufactured by the Heald Machine Company, Worcester, Mass. The transfer includes all tools, patents and parts. S. M. Trenary is sales manager.

The Peet Brothers Mfg. Company, Kansas City, Kan., soap manufacturer, will erect a branch plant at Third and Pardee streets, Berkeley, Cal., at an estimated cost of $118,000 for the first unit, to be completed about Oct. 1, 1916.

Cleveland

CLEVELAND, OHIO, Dec. 21, 1915.

The demand for small lots of machine tools is still active, but the aggregate volume of business is lighter than for some time. This is largely due to the fact that inquiries for round lots of machines have fallen off. The past week no large inquiries came out. The demand for turret lathes in small lots continues good, nearly all of this business coming from domestic sources. Machine-tool builders who have booked large export orders are having trouble in making shipments to the seaboard owing to railroad embargoes, and it is feared that this situation will grow worse.

The New York Central Railroad has an inquiry out for the following motor-driven machines:

One combination punch and shear with 48-in. stroke to punch 1¼-in. plate and shear bars 1⅛ x 6 in.
One 42-in. carwheel boring machine.
One double axle lathe
One 400-ton double end wheel press.
One 6-in. forging machine.

The first machine on the list is for the Englewood, Ill., shops and the remainder for Airline Junction, Ohio.

It is announced from Warren, Ohio, that a sherardizing plant, which for the present at least will be operated in connection with the General Malleable Company, will be established in that city. E. T. Ward, J. E. Ward and H. R. Weldon are stockholders.

The Diller Mfg. Company, Bluffton, Ohio, has taken over the Big Four Sales Company, Findlay, Ohio, and plans to move the plant to Bluffton. Its products are forms for the display of suit materials.

The Samuel Austin & Sons Company, Cleveland, has just taken a contract for the erection of a large manufacturing plant for the Hooker Electro-Chemical Company, Niagara Falls, N. Y., for a factory building for the A. P. W. Paper Company, Albany, N. Y., and three buildings for the General Electric Company, the latter to be built at an eastern

point. It is stated that these contracts aggregate over $1,250,000. Another contract recently taken by this company is for a four-story fireproof building for the Standard Oil Company in Cleveland.

A company is being organized by Canton and Alliance, Ohio, men to establish a plant in Canton to manufacture gas and gasoline stoves. The company will probably be known as the Canton Stove Company and will have a capital stock of $150,000.

The extensions to the plant of the Canton Steel Foundry Company, Canton, Ohio, are nearing completion. A new furnace and drying and core ovens are being installed.

Milwaukee

MILWAUKEE, WIS., Dec. 20, 1915.

For the first time in at least four years, the holiday season will not cause considerable interruptions in the production of metal-working shops, due to urgent delivery specifications. While the shops will close on the two holidays proper, there will not be the usual lay-offs, and all the men who are willing to work will be kept on all of next week at the usual schedules. Domestic demand for some time has overshadowed foreign buying, and if deliveries could be guaranteed, tool builders would be confronted with the necessity of an output double that of the present in order to fill requirements.

The production of electric steel is taking fast hold in this vicinity. Not only are new companies being organized to make steel by the electric furnace, but established foundries are installing electric furnaces. Installations of this kind are founded on actual business and are not of a speculative nature.

The Fitzsimmons Steel & Iron Company, Chicago, is preparing to establish a mill in the Menomonee Valley at Milwaukee. Herman J. Esser, 402 Camp Building, is preparing plans for a one-story brick structure, 100 x 200 ft., to be located at Park Street and Eighth Avenue.

Kampe & Schill, Grand Rapids, Wis., will erect an addition, 20 x 48 ft., to their garage, to be used for a machine shop.

The Common Sense Trunk Company, Racine, Wis., has been organized with $50,000 capital to manufacture trunks and bags. The promoters are Henry Hartmann, L. S. McDonough and George H. Wheary. The company intends to open its factory Jan. 3, employing 100 men.

Articles of incorporation have been filed by the Miller Scrap Iron Company, Green Bay, Wis. The capital stock is $20,000, and the incorporators are Herman and Morris Miller and F. J. Redfield.

A half-dozen metal-working shops in Sheboygan, Wis., are stated to have declined large orders for machine work on war munitions. After the declinations were forwarded, offers were made to buy the lathe and other tool equipment. These offers were also turned down. Among the shops mentioned are the Globe Foundry Company, Jenkins Machine Company and Optenberg Iron Works.

The Mitchell-Lewis Motor Company, Racine, Wis., is installing a new 300-hp. boiler and making other extensions of its power plant to accommodate an increased demand throughout its automobile shops.

The M. L. Walsh Machinery Company, 129 Second Street, Milwaukee, has purchased the entire machinery and equipment of the defunct Lueck Mfg. Company, 600 Enterprise Building, wire and metal specialties, vacuum cleaning machines, etc. The lot is being marketed in parcels.

The Henes Garage Company, Milwaukee, has been incorporated with $1,500 capital by G. L. Henes, Charles Funk and J. S. Brennan to conduct a garage and machine shop at 276 Twenty-sixth Street.

The United States Electric Tool Company, Milwaukee, has been incorporated to manufacture electrical tools and appliances. The capital stock is $25,000, and the incorporators are John C. Zeman and F. J. Ramler, 150 Oneida Street, and Frank Kraemer.

The Federal Bridge Company, Waukesha, Wis., is working on an order for 300 Waite farm tractors for delivery within six months from Jan. 1. As previously noted, it undertook some time ago the manufacture of tractors for outside interests. The new order is from the Nielson Farm Machinery Company, Minneapolis, Minn.

H. W. Hagen & Co., Manitowoc, Wis., are having plans prepared for a garage and machine shop of brick, two stories, 50 x 115 ft.

The French Battery & Carbon Company, Madison, Wis., which lost its plant by fire on Dec. 1, will build a reinforced concrete factory, 100 x 180 ft., two stories and basement. J. B. Ramsey, 120 South Dickinson Street, is president.

The Rice Lake Motor Company, Rice Lake, Wis., will erect a garage and machine shop, 66 x 132 ft., one and two stories.

It is unofficially reported that the Chicago & Northwestern Railway Company has decided to build its new northern division car shops at Green Bay, Wis., during 1916. Employment is to be offered to about 500 workmen. No further details are divulged.

August Struve, Ogema, Wis., will build a garage and repair shop, 56 x 100 ft.

The Sieverkropp Engine Company, 1220 Eighteenth Street, Racine, Wis., intends to occupy its new factory at Racine Junction about Jan. 15, and will add 75 to 100 workmen to its payroll.

Fire destroyed the plant of the Northwestern Barrel Company, Milwaukee, Wis., causing a loss of about $20,000.

Cincinnati

CINCINNATI, OHIO, Dec. 20, 1915.

Business men in this section are very much interested in the report that the receivers of the Cincinnati, Hamilton & Dayton Railroad Company have authorized expenditures sufficient to double track the line from Cincinnati to Hamilton. Shop extensions are contemplated later. The Chesapeake & Ohio Railroad Company will also make improvements at Portsmouth, Ohio.

Reports from Hamilton, Ohio, as to the labor situation are more encouraging. Quite a number of men returned to work last week and it is thought that the end of the present trouble will be reached early after the first of the year. The Cincinnati shops also made gains, and with the exception of a few plants, the situation is close to normal. As has been pointed out, the number of machinists at work here is much above the average for normal times.

Machinery dealers report a very good business just now; but, like the manufacturers of machine tools, they are held up on deliveries. Second-hand machinery dealers only have a fair trade. Tank builders are busy, but the boiler end of the business is somewhat slow. Small electric generators and motors are in good demand.

The John Steptoe Shaper Company, Cincinnati, has tentative plans under way for an addition to its plant on Colerain Avenue, 65 x 85 ft., two stories, of brick construction.

It is reported, but not yet officially confirmed, that the Oesterlein Machine Company, Cincinnati, has purchased a large site in the Camp Washington district on which it intends erecting a plant for the manufacture of machine tools. The company's present plant is on Spring Grove Avenue.

The United States Playing Card Company, Norwood, Ohio, a Cincinnati suburb, has had plans prepared for an addition to its factory, 30 x 60 ft., four stories, of reinforced concrete construction.

The Mal-Gra Castings Company, Cincinnati, has been incorporated with $10,000 capital stock, but no information as to its plans has yet been given out. J. W. Brown, Commercial Tribune Building, is one of the principal incorporators.

The Cincinnati Rubber Company, Norwood, Ohio, is having plans prepared for an extensive addition.

The Huenefeld Company, Cincinnati, maker of sheet metal specialties, has let contract for a six-story addition to its plant on Spring Grove Avenue. Metal-working and transmission machinery will be required.

The Champion Carbon Company, Loveland, Ohio, has let contract for rebuilding its plant, recently damaged by fire.

The Fox Paper Company, Lockland, Ohio, has increased its capital stock from $400,000 to $420,000, and it is rumored contemplates increasing its manufacturing facilities.

The Williamson Heater Company, Cincinnati, has taken out a permit for an addition to its foundry in Oakley. Very little extra equipment will be required.

The Dayton-Jeffrey Machine & Tool Company, Dayton, Ohio, has been incorporated with $5,000 capital stock by B. W. Jeffrey and others.

The new six-story plant of the Elwood Myers Company, Springfield, Ohio, has been completed and the machinery is being installed. The company makes metal signs and specialties.

The Rustler Mfg. Company, Springfield, Ohio, maker of a sugar beet harvesting machine, will soon double the capacity of its plant.

The John O. Heinze Company, Springfield, Ohio, manu-

facturer of automobile self-starters, is now operating its plant in the Shuey Factories Building, and contemplates adding to its equipment.

The Board of County Commissioners, Springfield, Ohio, will open bids Dec. 30 for boilers and other equipment to be installed in the Clark County Memorial Building.

The Barger Mfg. Company, Columbus, Ohio, has been incorporated with $30,000 capital stock to manufacture fire-fighting apparatus by F. C. Barger and others. Nothing is known as to manufacturing plans.

The Ironton Incandescent Stove Company, Ironton, Ohio, J. Davis, manager, has had plans prepared for a factory building to be erected on Front Street.

The American Tool & Mfg. Company, Urbana, Ohio, will move into larger quarters and add to its machinery equipment.

The American Lathe & Press Company, Columbus, Ohio, recently incorporated, has acquired the plant of the Columbus Machine & Tool Company, which will be put in operation at an early date. Considerable equipment will be installed, but no lists are yet available.

The West Carrollton Parchment Company, Dayton, Ohio, will make a one-story brick addition to its plant, 75 x 100 ft. Paper-making machinery and transmission equipment will be required.

The Mercer Garage & Electric Company, Zanesville, Ohio, has been incorporated with $10,000 capital stock by Joseph K. Mercer, and others. A general garage and repair shop will be operated.

Indianapolis

INDIANAPOLIS, IND., Dec. 20, 1915.

The syndicate which has taken over the assets of the Premier Motor Car Company, Indianapolis, Ind., plans to install several hundred thousand dollars worth of machinery in the T. B. Laycock factory, which it has acquired.

The Hoosier Post Company, Terre Haute, Ind., recently incorporated, has taken out permit for a factory 36 x 100 ft. to cost $2,500.

The Union Iron Products Company, East Chicago, Ind., has been incorporated with a capital of $50,000 to manufacture iron and steel. The organizers are C. E. Kitchin, C. L. Carter and S. M. Dague.

The Kokomo Machine & Foundry Company, Kokomo, Ind., which has taken over a plant already built in that city and overhauled it, is installing new equipment for the manufacture of stokers. The foundry will also have capacity for the handling of general jobbing work.

The International Steel & Iron Company, Evansville, Ind., will add three buildings to its plant in the next four months at a cost of $70,000.

A coaling station to cost about $150,000 will be built at Bicknell, Ind., by the Pennsylvania Railroad Company.

The Karges Wagon Company, Evansville, Ind., is on full time. It recently turned down a war order for wagons, owing to the press of domestic business.

The Indianapolis Drop Forging Company, Indianapolis, Ind., is erecting an addition to its forge shop, 50 x 60 ft., of steel, and is adding several steam hammers of large capacity, three large forging presses, one centrifugal blower, annealing furnaces and 500 hp. to its boiler capacity. Ferdinand Barnickol is vice-president and general manager.

The Royer Wheel Company, Aurora, Ind., has been incorporated with $150,000 capital stock to manufacture wheels and vehicle accessories. The directors are L. T. Moore, L. N. Gatch and Robert A. Taft.

The Portland Silo Company, Portland, Ind., has been incorporated with $25,000 capital stock by J. A. Long, I. H. Robinson and Frank B. Jaqua to manufacture silos.

The Loehr Acetylene Company, Warsaw, Ind., has been incorporated with $30,000 capital stock to manufacture acetylene lighting plants, generators, etc. Miles E. Loehr, Walter K. Loehr and Nelson E. Miller are the directors.

The Aluminum Hollow-Ware Company, Marion, Ind., has changed its name to the Marion Brass Foundry Company.

The Premier Service Company, Indianapolis, has been incorporated to manufacture automobile parts and accessories. The directors are George B. Morris, Omar L. Michael and P. M. Jenkins.

The Indiana Auto Radiator & Lamp Company, Indianapolis, has been incorporated by Louis Stein, A. Stein and J. Goldstein with $5,000 capital stock to manufacture metal articles.

The Bucyrus Company, Evansville, Ind., manufacturer of steam shovels, is at work on forty lathes capable of turning out a 6-in. piece of artillery.

The Danville Refractories Company's plant at Danville, Ill., has been sold by the receiver to the American Refractories Company of Chicago for $170,000.

The Indiana Hollow Ware Company, Jeffersonville, Ind., has been organized with a capital of $50,000 to buy hollow ware, castings and iron pipe. The incorporators are Edward W. Abrams, John C. Mott, John H. Winterbotham, Milton M. Jones, E. Brush Hatcher.

Detroit

DETROIT, MICH., Dec. 20, 1915.

The Novo Engine Company, Lansing, Mich., has plans under consideration for a new foundry building, 125 x 325 ft., to be erected at once. New equipment for the entire foundry will be installed.

The Homer Furnace Company, Homer, Mich., will build, in addition to its new foundry, a cleaning and mounting building. Contracts for equipment will not be closed until after the first of the year.

The Plymouth Motor Castings Company, Plymouth, Mich., whose plant was destroyed by fire Nov. 24, has completed a new structure and plans to resume operations about Dec. 20. At the time of the fire its output was contracted for up to Aug. 1, 1916; but its new capacity will double its former output. The cost of the new building was about $2,000. J. B. Hickey is manager.

The Republic Brass & Bronze Company, recently incorporated with a capital of $25,000, has taken possession of the plant of the Pontiac Motor Castings Company, Pontiac, Mich., where it will engage in the manufacture of brass, bronze and aluminum castings.

The Grand Rapids Foundry Company, Grand Rapids, Mich., has increased its capital stock from $50,000 to $75,000.

The Enterprise Brass Works, Muskegon Heights, Mich., has broken ground for a new factory building, 80 x 150 ft., which will cost in the neighborhood of $15,000.

The Jackson Machine Tool Company, Jackson, Mich., has been incorporated with a capital of $30,000.

The Central South

LOUISVILLE, KY., Dec. 20, 1915.

Machinery manufacturers report business the past week heavier than in several years, and orders booked in excess of recent monthly totals. The trade seems to be coming with a rush, especially power plant machinery. Special equipment of various kinds is also in good call. Manufacturers, especially those using sheets, are hampered by the difficulty of securing material, and this is preventing as heavy working schedules being applied as would otherwise rule.

The Automatic Package Scales Company, Fourteenth and Magazine streets, Louisville, is putting out a line of weighing devices. The company at present is assembling, but plans to equip a factory. C. A. Edinger is in charge.

The Johnson Foundry & Machine Shops, Madison, Ind., is equipping its plant for automobile repairing.

The White Star Coal Company, Pineville, Ky., is in the market for a 150-kw. motor generator set; a 6-ton electric locomotive, steel rails and other supplies.

Thad W. Martin has purchased the plant of the Elkton Machine Company, Elkton, Ky., and plans to make improvements.

The Illinois Central Railroad, which is now building car repair shops at Nonconnah, Tenn., is reported to have plans for the erection of a steel car-building plant there in 1916.

The Southern Slate Company, Chilhowee, Tenn., is planning the establishment of a cement mill.

The Hitt Lumber & Box Company, Chattanooga, Tenn., has been incorporated with $100,000 capital stock and will operate a plant which has been taken over. Box-making machinery will be purchased at a cost of $15,000.

The Parker Mfg. Company, Florence, Ala., is removing its headquarters to Chattanooga, Tenn., and is contemplating the establishment of a foundry there. It makes heating and ventilating equipment.

The Zickgraf-Jensen Lumber Company, Jellico, Tenn., will build a sawmill.

The Majestic Gray Marble Company, Knoxville, Tenn., will rebuild its plant, recently burned, and will install quarrying machinery.

Elrod & Co., Erwin, Tenn., are in the market for a second-hand spoke equalizer and for a machine to bolt logs into spoke blanks, etc.

The Boone Fork Lumber Company, Elizabethton, Tenn., is in the market for an 8-ft. bandmill and resaw. Three steel inclosed boilers are also wanted.

The John G. Duncan Company, 308 West Jackson Avenue, Knoxville, Tenn., is in the market for a second-hand 40-hp. Houston, Stanwood & Gamble engine.

The Knoxville Fibre Company, Knoxville, Ky., is being organized to manufacture fiber containers for milk, etc.

The Southern Railway, general offices Washington, D. C., is planning improvements at its shops at Coster, a suburb of Knoxville, Tenn. A steel car repair shop, 73 x 480 ft.; a 45,000-gal. water tank, and a metal reclaiming shed are among the items on the program for 1916.

The Casey-Hedges Company, Chattanooga, Tenn., has booked an export order to Buenos Ayres, Argentina, which includes six boilers, to develop a total of 1000-hp.

Birmingham

BIRMINGHAM, ALA., Dec. 20, 1915.

The machinery market is quite active so far as woodworking machinery is concerned. Ice plants and fertilizer factories being built are also liberal purchasers of equipment. The general trade shows little disposition to fall off on account of the holidays. Gasoline engines are selling briskly.

The Safety Brake Shoe & Manufacturing Company, Birmingham, Ala., will build a plant for making steel brake-shoes. W. L. Allen, Montgomery, and others are the promoters. The capital stock is $30,000.

J. T. Hamilton, West Palm Beach, Fla., will establish a machine shop at Okeechobee.

Wilson & Toomer Fertilizer Company, Jacksonville, Fla., will establish a fertilizer plant near Tampa at a cost of $200,000.

St. Louis

ST. LOUIS, MO., Dec. 20, 1915.

Pressure on the machine-tool market continues heavy, with dealers making every effort to fill orders with whatever tool will accomplish the work desired even though it may not be exactly that called for. The demand is broadening into industrial fields not even remotely connected with war business. Scouts are kept out all the time now searching for second-hand tools. Many are inspected by the ultimate purchaser wherever found and a sale made on the spot. The development of a broader investment feeling in connections with new enterprises is noted.

Frederic A. Kehl, St. Louis, Mo., has purchased a site and will erect a building for the manufacture of electric signs. It will be occupied by the Brilliant Sign Company, which he controls.

The plant of the A. Geisel Mfg. Company, St. Louis, Mo., manufacturer of tin, sheet metal and other products, has been burned with a loss estimated at $150,000. It will be rebuilt.

The Artophone Company, of St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Robert H. Cone, Jr., and others to manufacture phonographs, etc.

The Larmore Ice Cream Company, St. Louis, Mo., is in the market for cooling room equipment, gas steam generators, steam heating plant, gas hot-water heaters, etc., for its wholesale ice cream and refrigerating plant.

The South Side Garage Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by Joseph Macher, J. F. C. Wegener, E. G. Oldendorph and H. Macner.

The Hammond Case Company, Kansas City, Mo., has been incorporated with a capital stock of $20,000 to manufacture sample cases, trunks, etc.

The A. F. Bauer Engine & Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by A. F. Bauer, W. B. Dickingson and Percy A. Budd to manufacture boilers, engines and machinery.

The Rice Sturtevant Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $16,000 by T. M. Sturtevant, L. D. Rice and W. H. Reed and will equip a machine shop and garage.

The Western Chemical Aniline Company, Kansas City, Mo., has been incorporated with a capital stock of $250,000 by H. T. Wiemann, Jacob Weisser and Maria Weisser to manufacture chemical, oil and asphalt products.

The Sapulpa & Oil Fields Railroad, S. W. Barnes, superintendent, Kansas City, Mo., will install electric generating equipment.

Cardwell, Mo., has appropriated $5,000 for waterworks station equipment.

Kansas City, Mo., J. P. Langan, purchasing agent, will receive bids until Jan. 12 for a steam turbine, reduction gear, centrifugal unit for its waterworks plant with a 24-hr. capacity of 20,000,000 gal. against a head of 360 ft., steam pressure of 165 lb. at throttle, etc.

The Pan American Oil & Transportation Company, organized by E. L. Doheny, Los Angeles, Cal., and Thomas C. Shotwell, 52 Broadway, New York, is reported as planning heavy oil refinery, pumping, pipe line and other installation in Oklahoma. Its capital is $100,000,000, with $50,000,000 of convertible bonds.

Clayton Brothers, Hartford, Ark., will equip a 15-ton refrigeration plant.

The Bartlesville Salvage, Machine & Supply Company, Bartlesville, Okla., has been incorporated with a capital stock of $20,000 by M. Modell, I. Morrison and L. Morrison.

The Oklahoma Welding & Mfg. Company, Oklahoma City, Okla., has been incorporated with a capital stock of $15,000 by George A. Hughes, B. McKenna and George E. Clayton, and will install equipment at once.

The McAlester Ice & Pure Food Products Company, McAlester, Okla., Coursen H. King, Jr., president, will install equipment for a 50-ton ice and refrigerating plant.

Crosbie & Mitchell, Tulsa, Okla., will install a refrigerating plant in connection with a storage warehouse now under construction, five stories, 100 x 140 ft.

The Fort Smith Iron & Steel Mills, Arkoma, Okla., have been incorporated with a capital stock of $25,000 by Thomas B. Latham, McAlester; R. W. Cotton, Cameron, Okla., and James W. Arnold, Fort Smith, Ark.

The Crossley Brothers Auto Company, Beaver, Okla., has been incorporated with a capital stock of $15,000 by H. N., A. A. and C. B. Crossley and will equip a machine shop and garage.

Wesson, Miss., will receive bids until Jan. 4 for electric light and waterworks plants. Paul Burt is city clerk. M. L. Culley, Jackson, Miss., is consulting engineer.

The Gammill Lumber Company, Pelahatchee, Miss., has increased its capital stock from $350,000 to $500,000 and will extend its mill equipment.

The R. L. Rhymes Lumber Company, Macon, Miss., R. L. Rhymes president, will equip a mill of about 25,000 ft. daily capacity.

The Yazoo City & Mississippi Railroad Company will not erect the roundhouse and machine shop at Clarksdale, Miss., recently announced as planned.

The Port Commission, New Orleans, La., is receiving bids for grain elevator equipment, including a 2000-lb. capacity elevator, electrically operated; 48 three-phase, sixty-cycle, 440-volt alternating current motors of from 3 to 150 hp., sliding bases, starting compensators, seven 2000-bu. capacity grain hopper scales, trussed lever type; clipper of 1200 to 3500 capacity and other equipment. Ernest M. Loeb should be addressed. Ford, Bacon & Davis are in charge of plans.

The Salmen Brick and Lumber Company, Slidell, La., will equip a sawmill with two band and two gang saws, daily capacity, 150,000 ft. E. H. Michel, Whitney-Central Bank Building, New Orleans, La., is buyer.

San Francisco

SAN FRANCISCO, Dec. 14, 1915.

Conditions in the machinery market are unusual, showing divergent tendencies. While most local buyers are disposed to hold up purchases, requirements seem to be increasing, keeping pace with the scale of operations in the shops. At the same time, machine-tool prices have again advanced, and are considered prohibitive except for absolute necessities. The few tools available for delivery are readily disposed of, and most of those on exhibition at the exposition have been sold. Many inquiries from the Middle West are reported. Seasonable weather is delaying delivery of mining machinery, but many new inquiries are appearing. Woodworking lines show a slightly healthier tone, and inquiries are beginning to appear for heavy irrigation equipment for installation in the spring.

Shipbuilding is the most conspicuous local activity. The Union Iron Works has taken contracts for two more steamers of 10,000 tons each, which, with work already in hand, will keep all its facilities occupied for many months. This is throwing a large volume of repairs, and some new work, to other shipbuilders. The United Engineering Works has taken a contract for a good-sized steel steamer, and is building engines for several wooden coasting vessels. The decision to build two battleships at the Mare Island Navy Yard will also affect the local market.

The Great Western Power Company has announced plans for improvements, including two motor generator sets for Oakland to cost $150,000, and an additional unit at the Big Bend hydroelectric plant, costing $500,000.

The Buick Motor Company has arranged for the construction of a two-story steel and concrete foundry 300 x 530 ft., at San Diego, Cal.

The Pacific Machine Works, San Francisco, has been incorporated with a capital stock of $500,000 by R. N. Griffith, H. F. Hansen and B. J. Wyman.

The offices and showrooms of the Union Gas Engine Company, San Francisco, have been removed from 503 Mission Street to 24 California Street.

The Airhart & Knorr Machine Company and the Coburn Machine Company, San Diego, Cal., have consolidated under the name of Modern Machine Works, locating at 355 Fifteenth Street.

The Red River Lumber Company, Westwood, Cal., is building a new sorting shed, in which lumber will be handled by electric cranes.

The Chevrolet Motor Company, Flint, Mich., has arranged for the purchase of a factory site in Oakland, and it is announced that contracts will be let shortly for three buildings. Plans call for electrically-operated machinery.

The Ford Motor Company is preparing to add a five-story building to its assembling plant in San Francisco.

The Pacific Electric Railway, Los Angeles, will remove its repair shops there to Torrance.

The Iron Cap Copper Company, near Globe, Ariz., is preparing to increase its power plant and hoisting equipment.

The Hurrie Window Glass Company has started work on a factory near Los Angeles.

Texas

AUSTIN, TEX., Dec. 18, 1915.

The Texas Keystone Steel & Wire Company, Dallas, has been organized with a capital stock of $25,000 by H. G. Moore, P. W. Sommer, L. E. Burgess and others.

The Sabine Stave Company, Beaumont, has been organized for the purpose of manufacturing staves. L. J. Witherspoon is in charge.

The Pacific Northwest

SEATTLE, Dec. 14, 1915.

Equipment companies handling orders from lumber and logging companies report a sharp demand for cars, trucks and other material among the mills of Oregon and Washington, with prospects of a very busy year for 1916. A very satisfactory business is being done in steel castings, especially manganese and chrome steel castings, used to equip gold dredges and other mining equipment. Large orders are being placed almost daily for mining machinery.

Dealers in sheet metal, including galvanized iron, steel, copper, lead and zinc have laid in much heavier stocks for 1916 than for the early part of 1915, due to the increased prices of most of these metals. Great demands are felt for this material in building lines.

The plant of the Consumers Lumber & Supply Company, near Linnton, Ore., has been purchased by George R. Comstock, 429 Lumbermen's Building, Portland, and associates, who will make improvements and additions to cost $25,000. A complete box factory and planing mill, automatic trimmer, hand saw, gang saw, enlarged engine and boiler caacity, new docks, etc., are contemplated. In addition the company is seriously considering the construction of a shipbuilding plant nearby.

The plant of the Clarke County Iron Works, Vancouver, Wash., will be moved to Portland, Ore., where it will be located at Tenth and Flanders streets. The company will renew operations with a force of thirty mechanics.

The Pacific Coast Steamship Company, Seattle, plans to convert its steamships from coal burners to oil burners at a cost of more than $100,000.

The Seattle Machine Works, Seattle, has leased tracts Nos. 4 and 5, Industrial Tracts, Seattle, on which it proposes to erect a machine works.

The Pringle Falls Water & Power Company, La Pine, Ore., has been sold to an Eastern syndicate, headed by Tomes Brothers, Portland, for $300,000. The plant will be enlarged.

The Idaho National Harvester Company, Moscow, Idaho, has secured an order for high explosive shells, shrapnel time fuses, brass cases, gun mounts and machine tools.

The Hodson-Feenaughty Company, Portland, is establishing metal culvert and metal tank works in connection with its present plant on East Yamhill Street.

The Rhodes Harvester Company, Moscow, Idaho, has been incorporated for $200,000 by W. M. Rhodes, C. A. Hagan, William Hunter, all of Moscow, to manufacture a harvester.

The St. Helens Shipbuilding Company, St. Helens, Ore., contemplates the erection of a plant capable of turning out steel vessels. It operates a shipbuilding plant which can construct wooden vessels only, but it is proposed to enlarge the plant so that steel hulls with maximum length of 350 ft. may be built. The company is largely owned by the Charles R. McCormick Company, San Francisco.

Canada

TORONTO, Dec. 20, 1915.

The Canadian Electro-Products Company, Montreal, incorporated with a capital stock of $500,000 with J. S. Norris, Howard Murray and Julien C. Smith as directors, has purchased the Record Foundry Building at Montreal and is installing machinery for the manufacture of shells and other munitions. It will also install an electric furnace.

The Canada Foundries & Forgings, Ltd., Montreal, has received two contracts for shell forgings, which will necessitate further extensions to its plant. The company is now turning out complete shell forgings, consisting of diaphragm and base plate, at the rate of 12,000 per day. One of the new contracts calls for 3000 6-in. shells per day, and the other is for 30-lb. shells.

J. J. Carrick has formed the Transcona Shell Company, Ltd., Montreal, with a capital stock of $50,000 and has taken over the Transcona shops at Winnipeg, Man., and will immediately install machinery for the manufacture of small shells. Most of the machinery at present in use at the Transcona shops is of little value in the manufacture of shells. The Transcona Shell Company has received an order for 250,000 small shells.

Improvements to cost over $100,000 will be made to the Canadian Pacific Railway boats, which are put up at Owen Sound, Ont., for the winter. J. R. Cunningham is the local agent.

H. H. Powers, Unionville, Ont., is in the market for a 40-ft. derrick, with or without power; also a 4 or 6-hp. gasoline engine.

Two new boilers will be installed in the old General Hospital, Gerrard Street, East, Toronto. R. C. Harris is commissioner of works.

Newcastle, N. B., will install a motor-driven centrifugal pump of 350 gal. per minute capacity at its waterworks at a cost of $2,000. D. A. Jackson is electrical engineer.

Wilson Brothers, Collingwood, Ont., will build an addition to their planing mill to cost $35,000. H. A. Currie is president.

Keenan Brothers, Ltd., Owen Sound, Ont., is in the market for an engine lathe and plain milling machine.

The Dominion Sugar Company, Wallaceburg, Ont., has commenced the erection of a sugar refinery at Chatham, Ont., at a cost of $1,000,000. A machine shop 32 x 100 ft. is being erected, and a toolroom of the same size is being built. All inquiries should be addressed to the head office.

A plant to cost $1,000,000 is being built at the Trail Smelter, British Columbia, to treat zinc ores. It will be operated by the Canadian Consolidated Mining & Smelting Company.

Winnipeg, Man., will install two new gas engines at its high-pressure water plant on James Avenue, West. W. P. Brereton is engineer.

The Peterborough Metal Products Company, Peterborough, Ont., will establish its plant in the premises formerly occupied by the Canadian Cordage Company on Aylmer Street. New machinery will be installed.

The Manchester Iron Works, Ltd., Calgary, Alberta, has been incorporated with a capital stock of $50,000 to manufacture iron, steel, machinery, etc.

The Automatic Faucet Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $100,000.

The Grand Trunk Railway Company machine shop at Sebastopol and Leber streets, Montreal, recently destroyed by fire with a loss of $10,000, will be rebuilt.

B. Feeney will build a pumping station at Princeville, Que., in the spring at a cost of $25,000.

Harry Richards, Dacre Post Office, Ont., is preparing to rebuild his mill recently destroyed by fire, and is in the market for a planer, lath mill, waterwheel, etc.

The Superior Barn Equipment Company will establish a factory at Fergus, Ont.

E. Williams, 172 Glenora Avenue, Ottawa, is receiving prices on steam boilers, hot-water boilers, electric pumps, steel tanks, etc.

The Western Machinery Company, Lincoln Street, Port Arthur, Ont., will shortly move into larger premises on North Court Street, and will install a quantity of new machinery.

The International Steel Corporation, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by James R. Roaf, 18 King Street, West, Toronto; William Graham, David W. Gordon and others to manufacture steel machinery, etc.

The Montreal Steel & Foundry Company, Ltd., Montreal, has been incorporated with a capital stock of $150,000 by Joseph C. Lamothe, Outremont, Que.; Joseph M. Mantel, George D. Derome and others to manufacture machinery, iron, steel, etc.

The Canadian American Corporation, Ltd., Montreal, has been incorporated with a capital stock of $300,000 by Louis A. David, Louis E. A. D. Mailhiot, S. H. R. Bush and others to manufacture metals, machinery, etc.

G. Manton, Cleveland, Ohio, is interested in a company that is considering taking over the Northern Iron & Steel Works, Collingwood, Ont.

The McLaughlin Carriage Company, Winnipeg, Man., will build an addition to its factory 84 x 225 ft., three stories.

An addition 60 x 90 ft. will be built to the machine shop of William Baird, Dundas Street, Woodstock, Ont.

The Canadian Pacific Railway Company will install a 50-ton electric crane at its wharf at Vancouver, B. C.

The Vacuum Street Cleaning Machine Company is contemplating the erection of a factory at Windsor, Ont.

The Cobourg Steel Company will build a plant at Cobourg, Ont. George Thompson is in charge.

The Canada Copper Corporation, Greenwood, B. C., plans the improvement of its properties near Greenwood, with an expenditure of more than $2,000,000.

The Glass Garden Builders, 201 Church Street, Toronto, will commence the erection of a factory at Georgetown, Ont., to cost $25,000.

Bedford, Que., is installing a waterworks plant, for which pumping machinery has not yet been purchased. A. T. Gould is secretary.

The Canadian Canners, Ltd., Toronto, has been incorporated with a capital stock of $1,000,000 by John D. Montgomery, 44 King Street West, Toronto; Arthur C. McMaster, George M. Willoughby and others to manufacture cans and to operate canning plants.

The Canadian Brass Bedsteads, Ltd., Montreal, has been incorporated with a capital stock of $45,000 by Eugene H. Godin, Joseph E. Morier, of Montreal, and Joseph L. Girouard, Outremont, Que., and others, to manufacture metal bedsteads, etc.

Government Purchases

WASHINGTON, D. C., Dec. 20, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9117, for one 12-in. swing 4-ft. bed lathe for Portsmouth.

*No dates set to receive bids.

The United States Civil Service Commission, Washington, D. C., announces an open competitive examination for metallographist, for men only, not over 40 years old. From the register of eligibles resulting from this examination certification will be made to fill a vacancy in this position in the War Department, for duty at Watertown Arsenal, Massachusetts, at a salary of $2,000 a year, and vacancies as they may occur in positions requiring similar qualifications. Persons who desire this examination should at once apply for Form 2118, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C.; the secretary of the United States Civil Service Board, Post Office, Boston, Philadelphia, Atlanta, Cincinnati, Chicago, St. Paul, Seattle, San Francisco; Customhouse, New York, New Orleans, Honolulu, St. Louis, Balboa Heights, Canal Zone, or to the chairman of the Porto Rican Civil Service Commission, San Juan, P. R. Applications must be filed with the commission at Washington prior to the hour of closing business on Jan. 25, 1916.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

TRADE JOURNAL ADVERTISING AS MEANS OF TRADEMARK PROTECTION.—Manufacturers of machinery who have adopted valuable trademarks, and who are not extending their trade throughout the country, but who expect to do so, will find the following statement from a recent opinion of the United States Circuit Court of Appeals for the Sixth District of special interest, showing that an innocent though subsequent appropriator of the same trademark in new territory may acquire the exclusive right to use it there, notwithstanding the originator's prior use in other territory:

"There can be no absolute duty resting on one who adopts a trademark to bring it at once to the attention of everybody. Such duty as there may be in this direction must rest upon the obligation of the one adopting to realize that, in the absence of a widespread knowledge of the existence of his claim to it, others will be likely to adopt it and spend their money in its promotion in their own interest. This obligation must be as variant in degree as are the circumstances of each case from those of another case; but we cannot doubt that, under present conditions, there are cases in which some measure of such obligation does exist. Formerly, the number of competing traders in a given line—and, hence, the probability that another would hit upon the same trademark—was slight as compared with that number and that probability now; and formerly the means by which a trademark owner could spread general knowledge of his claim were comparatively ineffective, and the trade customs which now make it so much a matter of course for trademarks to be put before the public the country over, were largely non-existent. . . . From 1883 (when Rectanus' use [a conflicting use involved in the cited case] began), until now, it has been true that a small expense in trade journal advertising enables the trademark proprietor to put his article and its name before the entire trade; and the custom of so doing has been well-nigh universal. As business methods change, so change the fact standards of reasonable prudence and care in guarding business rights." (United Drug Company vs. Theodore Rectanus Company, 226 Federal Reporter, 545.)

LIABILITY FOR UNFORESEEN INJURY TO EMPLOYEE.—A manufacturer of machinery is not liable for disease or injury resulting to an employee in the handling of parts which have been previously dipped in oil and a solution of muriatic acid, and afterward submitted to washing under running water, if it was not shown that the employer knew or by exercising reasonable diligence should have known that the parts were in dangerous condition, that the oil was impure, that the process of dipping the parts in acid solution was an improper or unnecessary one, that any other employee had been similarly afflicted in the same kind of work, or that the complaining employee made any complaint until after his discharge from work sometime later. Iowa Supreme Court, Canfield vs. Iowa Dairy Separator Company, 154 Northwestern Reporter, 434.)

The Fuel Engineering Company of New York, 106 East Nineteenth Street, New York City, has issued a pamphlet entitled, "Measuring the Value of Coal." It points out that complete power measurement must begin with the energy value of the coal and that the Government and a number of industrial plants with an annual consumption ranging from less than 1000 up to 300,000 tons each find it advantageous to test the coal that they buy. The differences between various coals are emphasized, this section being supplemented by a chart illustrating the varying ash percentages in fourteen consecutive deliveries of two different semi-bituminous coals. A chart showing the relative values of anthracite and semi-bituminous coal of average quality based upon the results of routine coal tests made by the company for its clients is included.

Edgar T. Ward's Sons have moved from 23-25 Purchase Street to 44-54 Farnsworth Street, Boston, Mass.

NEW TRADE PUBLICATIONS

Rolling Lift Bridges.—Scherzer Rolling Lift Bridge Company, Monadnock Block, Chicago, Ill. Booklet. Describes completely the inception, development and use of the rolling lift type of bridge. As its name indicates, the bridge rolls as it opens to provide a clear channel for vessels. The advantages of this arrangement and some views of its construction are presented, the text being supplemented by a number of typical railroad and highway structures and a list of places where these bridges have been erected.

Refillable Fuses.—Monarch Refillable Fuse Company, Buffalo, N. Y. Catalog No. 2. Gives description and specifications of several types of refillable fuses of the knife blade and ferrule contact types and a special type for use in steel plants. Tables of the various sizes that can be supplied for each style are included.

Condensers and Cooling Towers.—Wheeler Condenser & Engineering Company, Carteret, N. J. Two booklets. One is the third edition of the company's steam tables for condenser work and the other is its psychrometric tables for cooling tower work. The steam tables are three in number and give the properties of saturated steam from 29.8 in. vacuum to atmospheric pressure, from 32 to 212 deg. Fahr. and from 0 to 200 lb. gage pressure, together with corrections of readings for the thermal expansion of mercury, relative thermal expansion of mercury and brass and for correcting the barometer to standard gravity, etc. The steam tables are based on those of Marks & Davis. After an introductory discussion on psychrometry, beginning with the terms used in connection with the psychrometric tables and problems having to do with moisture in the air, the meaning of the terms dry bulb and wet bulb, dew point and absolute and relative humidity are given with a formula for the weight of 1000 cu. ft. of air under any atmospheric conditions. The tables give the dry and wet bulb thermometer readings, dew point, per cent. humidity and the pounds of water vapor per 1000 cu. ft. for a range of 32 deg. dry and 28 deg. wet bulb temperature up to 140 deg. A table giving the pounds of moisture for 100 lb. of air corresponding to any dew point is also included, together with an appendix on the sling psychrometer with directions for using it in obtaining dry and wet bulb thermometer readings.

Rapid Threading Tools.—Murchey Machine & Tool Company, Detroit, Mich. Catalog. Illustrates a line of automatic collapsing taps, automatic opening die heads and special threading tools. The advantages of these taps and die heads are briefly presented, followed by illustrated descriptions of the various tools, with tables of the sizes that can be supplied. Mention is also made of a chaser and die-grinding machine and a semi-automatic double head nipple and pipe threading machine.

Foundry Equipment and Supplies.—J. S. McCormick Company, 2428 Railroad Street, Pittsburgh, Pa. Catalog No. 30. Size, 6 x 9 in.; pages, 371. Pertains to a line of foundry equipment, supplies and facings which practically covers everything required in the foundry. Where possible illustrations are used to supplement the text, and a description and a list of the various sizes and styles that can be furnished are given in many cases. A list of standard reference books on the iron and steel trade, and a number of useful hints and tables are included.

Steel Plate Construction.—Treadwell Construction Company, Midland, Pa. Calendar. Size, 19 x 24½ in. Each one of the leaves, in addition to the calendar for the month, mentions the various lines of steel plate construction handled by the company, which includes blast furnaces, cooling towers, pipe lines, ladle cars, galvanizing pans, steel cylinders, riveted and welded tanks, etc. A view of some typical piece of work is presented on each leaf.

Industrial Cars and Trucks.—Lakewood Engineering Company, Cleveland, Ohio. Book No. 16. Describes and illustrates an extensive line of side, bottom and end dump and other types of cars for factory and other uses, trucks for factory and steel plant work, including cars for core oven, billet handling, blast furnace skip, steel ingot, factory and mining service, rocker dump and hopper cars, industrial railway tracks and clamshell and other types of buckets. Attention is called to the consulting engineering department maintained by the company for meeting unusual requirements of manufacturing plants that cannot be solved by the upward of 400 kinds of cars, carts and trucks that are regularly built.

Hydraulic Pumps.—Deane Steam Pump Company, 115 Broadway, New York City. Bulletin D 184-25. Pertains to a line of high-pressure hydraulic pumps for handling water, oil or other liquids under pressures ranging from 500 to 1000 lb. per square inch. Illustrations of the various types of pumps are presented, together with brief descriptions and tables of the sizes in which they can be supplied. Mention is made of an automatic by-pass and check valve for use in connection with pumps supplying accumulators.

Sheet Metal Working Machinery.—F. H. Stolp, 92 Brook Street, Geneva, N. Y. Two circulars. Relate to an automatic self-feeding punch press for turning out automobile radiator fins and a machine for drawing tubing and molding in any form from a flat metal ribbon. These machines were illustrated and described at some length in THE IRON AGE, July 29, 1915.

Electrical Measuring Instruments.—Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Catalog No. 40 and bulletin No. 710. The first calls attention to apparatus for measuring low resistance and conductivity, and illustrates standard resistance units and the Kelvin and Hoopes bridges for the measurement of low resistance and conductivity respectively. Instructions for using the apparatus are included. The bulletin refers to the peak reading voltmeter for determining the maximum voltage on any alternating-current system. A brief description of the instrument is given supplemented by numerous halftone and line engravings.

Steam Turbines.—Terry Steam Turbine Company, Hartford, Conn. Bulletin No. 20. Gives a general description of various turbine applications that deal particularly with the different kinds of high, low and mixed pressure units. The book is illustrated by numerous engravings of the different machines, and line drawings are also presented to show the various features of construction.

Cutting-Off Machines.—George Gorton Machine Company, Racine, Wis. Two catalogs. The first, No. 641, describes and illustrates the 13-in. size of heavy-duty cutting-off machine for round and square bars or any other shape that can be contained within a 13-in. circle. A number of special attachments that can be furnished are illustrated and described, and a number of illustrations of work that has been done are included. The second, No. 710, contains the same information about the 6-in. size of machine.

Pipe and Fittings.—Mark Mfg. Company, Chicago, Ill. Catalog No. 12. Supersedes all previous editions and covers a line of black and galvanized wrought, line and drive pipe, well casing, boiler tubes, pipe fittings such as unions, nipples, etc., and the tools used in pipe fitting work. An explanation of the customs of the pipe trade follows a comprehensive index which, contrary to the usual custom, is placed at the front of the catalog. Tables of the various sizes and kinds of pipe and fittings follow with illustrations where necessary to explain some feature of the product.

Punching and Shearing Machines and Bending Rolls.—Covington Machine Company, Covington, Va., Manning, Maxwell & Moore, Inc., 119 West Fortieth Street, New York City, sales agent. Bulletin No. 11. Illustrates an extensive line of punching and shearing machines and bending rolls for all classes of service. There is no text in the bulletin, it consisting simply of illustrations, with figure numbers and the code words for ordering. The machines illustrated include double and single end vertical shearing machines for plates and structural shapes, horizontal punching and bending machines, gate shearing and multiple punching machines and shearing machines of various types.

Steam Shovels.—Ball Engine Company, Erie, Pa. Bulletin S-14, entitled "Facts, Figures, Photos." Describes as the title indicates chiefly by photographs the uses to which a revolving steam shovel may be put. These include trench and cellar excavations, highway work, railroad grading, etc., in various kinds of material. The several classes of work for which the shovel can be employed are listed, and a brief specification table and condensed description are included.

Rotary Planing Machines.—Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa. Catalog No. 50. Presents illustrations of the various sizes and types of rotary planing or girder ending and facing machines that are built. These machines were originally designed to finish the bases of structural shapes and iron columns, but are now employed quite generally in machine shops for milling flat surfaces on engine and turbine bases, split flywheels and similar castings in iron, steel and other metals. Specifications and brief descriptions of the different machines serve to supplement the illustrations, and there are a number of views of the machines in actual use.

Cinder Crushing Mills.—Standard Equipment Company, 47 Orange Street, New Haven, Conn. Pamphlet. Describes a cinder crushing and pulverizing mill which was illustrated in THE IRON AGE, July 29, 1915. A detailed description of the mill is presented, supplemented by halftone and line engravings and an account of the way in which it operates.